



COAL AGE



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Selecting the Right Hoist

BY L. F. MITTEN

A resume of the progress made in the art of coal hoisting is unnecessary in view of the treatment given this subject by the various technical journals. A glimpse into the future, however, as indicated by recent developments, reveals that the trend of the times foreshadows improvements along definite lines.

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So far as the engineer is concerned, it is possible to build a hoist that is faultless. Economic considerations however may demand a modification of the theorist's idealistic tendencies. In no branch of constructive industry is the statement that "engineering is the science of compromise" more thoroughly exemplified than in hoist building, and the design of a hoisting machine which gives the highest measure of success is obviously the one which results from a close coöperation between hoist buyer and hoist builder. Each is in possession of certain facts and experience which only in combination with those of the other yield a maximum of satisfactory results.

The manufacturer's experience, accumulated through much building, and his records of many installations and the results which they have achieved in operation enable him to propose preliminary plans which are certain to lean toward the correct ultimate design.

The buyer, on the other hand, knows precisely the physical condition of his property, the output which the machine must elevate or haul, the time in which this tonnage must be moved a certain distance, and the maximum amount which he can afford to pay for this transportation without exceeding a predetermined gross operating expense.

Clearly, then, a careful consideration of the necessities of *both* interested parties will reveal the weaknesses, the shortcomings and misfits in the builder's original plans, while in like manner the user's ideas and premises may possibly show need of extensive alteration and revision.

It should not be deemed sufficient for a buyer to ask competitive bids on a hoist meeting specifications formulated by himself. Nor can he hope to realize the highest value of his purchase when he arbitrarily places the business with the lowest bidder. How can the buyer know that his specifications will secure him the very best equipment, mechanically and financially, that a certain appropriation can buy?

In such a case he has only his own knowledge gleaned from a limited experience upon which to rely. He foregoes the benefit of the hard experience acquired by the managers of other properties more or less remote—experience which in all likelihood would cause a modification of his specifications and give him ultimately a better equipment. This experience, wide and comprehensive, properly filed and digested, is in possession of the hoist builder who will gladly give him its full benefit in the course of coöperative consultations.

Hoist buyers are now much less prone than formerly to wire: "Quote price No. A263Z, catalog page 71, 500 volts d.c. at once." They are beginning to realize that the only advantage in this method of buying lies in a quicker delivery—perhaps—while among its manifold disadvantages is almost certain inefficiency, which in the end means expensive hoist performance.

The more recent procedure in hoist buying is rather along the lines described in the article on page 402, where the duty required of the machine was first definitely specified and the 23 limitations or safeguards of performance agreed upon.

Coöperation between builder and buyer here begets a thoroughly satisfactory product. Utmost economy is realized under the specified conditions, a minimum of weight is secured through a judicious distribution of metal, least current or coal consumption is attained because of carefully planned proportions and ratios. The haulage cost per ton of coal is low since the machine admirably meets the demands made upon it. A maximum output is possible, since every contingency has been regarded as a certainty and provision therefor embodied in the design.

Hoist buyers and builders are getting together. It is more than possible that the future may disclose a more universal recognition of the advantages that accrue through their closer coöperation.

Electric Shaft Hoists Installed by the Lehigh Coal & Navigation Co.

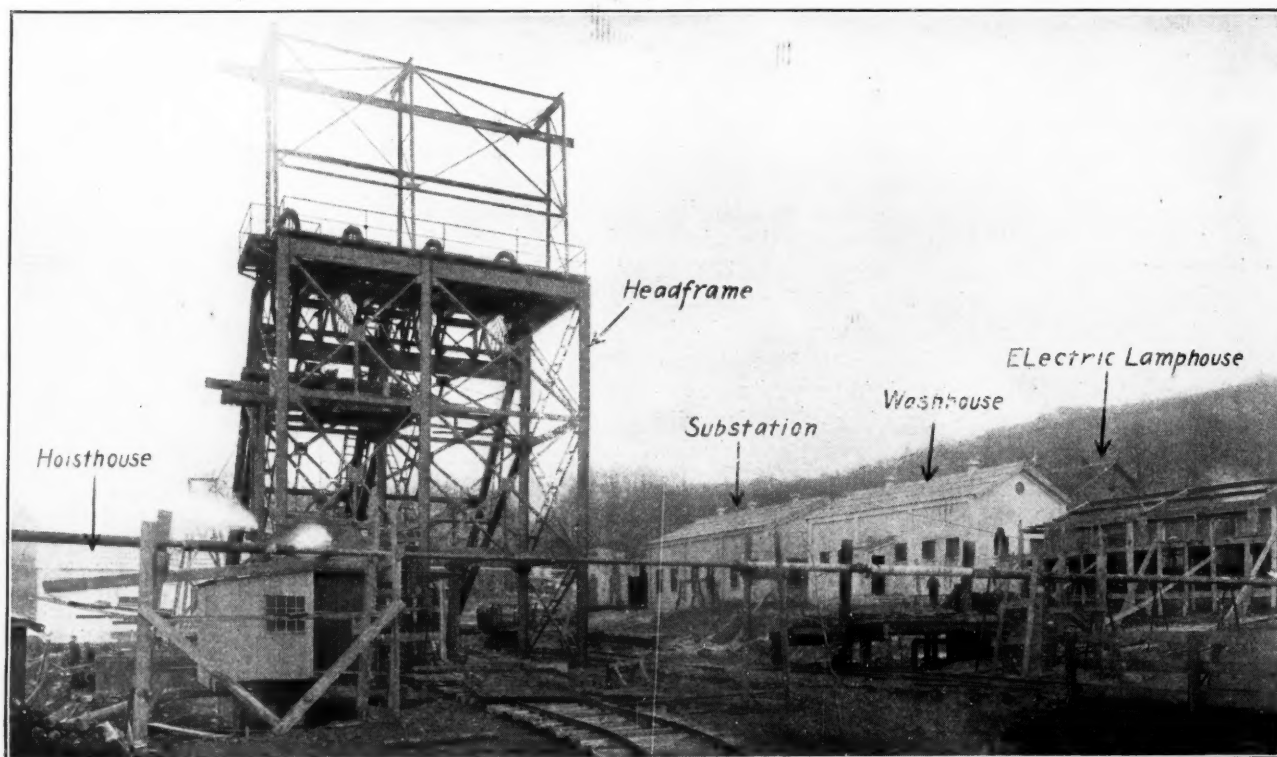
By R. E. HOBART*

SYNOPSIS—After a careful test of a steam mine hoist it was decided that if the manufacturer's guarantees could be realized electric hoisting would be a paying proposition. An electric hoist built to exacting specifications was accordingly installed. This machine has proved entirely satisfactory from every standpoint.

The advantages inherent to power produced in large quantities at or adjacent to coal mines have been readily conceded. The cost of thus manufacturing energy should be extremely low, and mining regions as a rule usually use large quantities of power.

boiler plant and pipe-line transmission would be out of the question.

As the Lehigh Coal & Navigation Co. was contemplating the development of a number of new operations, and the modernizing of some of its old plants, it decided to investigate the savings claimed for the use of electricity. The steam and power consumption of the majority of the individual operations in and around the mines could be easily determined. The question, however, of the power used by large hoisting engines was one on which no reliable information could be found. The opinion of various engineers differed to such an extent that it was decided to conduct a test under actual operating conditions at one of the collieries.



GENERAL VIEW OF SURFACE PLANT AT NO. 11 SHAFT

The vital question to the Lehigh Coal & Navigation Co. was whether or not it would pay to purchase power, or to continue in the time-honored custom of the generation of steam and its utilization at individual boiler plants.

This company owns and operates a number of anthracite mines throughout the Panther Creek Valley, situated in Carbon and Schuylkill Counties, Pennsylvania. The gross output for the year 1914 was 4,240,777 tons. To produce this amount of coal required the consumption of 494,481 tons of fuel in the company's various boiler houses. This large consumption of boiler fuel is the result of a poor load factor per individual boiler plant, and, due to the extent of the operations, a central

In order to do this, the coal hoist at No. 10 shaft was selected for the test. This engine is a first-motion 30x 60-in. piston-valve machine, of the most modern type and comparatively new. The boiler plant from which this hoist received its power is of 4800 hp. capacity, carrying 125 lb. steam pressure. The hoist is located approximately 600 ft. from the boiler plant and is fed by a 10-in. steam line protected with magnesia pipe covering.

To prepare for this test the company had two batteries of boilers, aggregating 1200 hp., cut off from the main boiler plant. Steam auxiliaries, such as feed-water pump, blowers, etc., were fed by the boilers in the test and their consumption charged against the hoist.

A barrel weighing device was installed to accurately weigh the consumption of water. The fuel, No. 3 buck-

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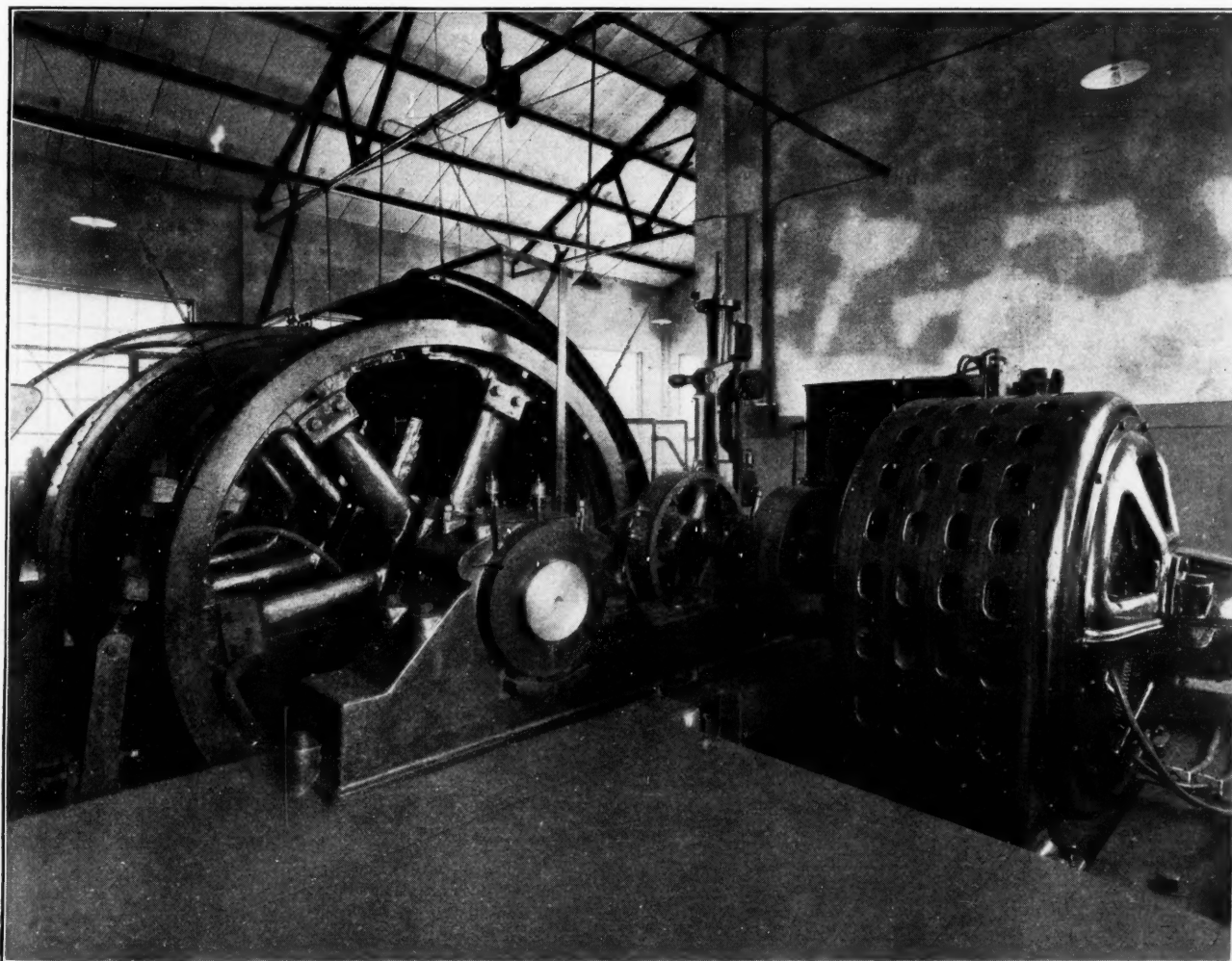
wheat, was weighed in the ordinary manner for boiler trials. All the usual precautions in connection with such tests were taken, and the company feels that the results obtained were fair indications of the operating conditions at its various collieries.

Throughout the test a careful record was kept of the consumption of fuel during the working and idle time. The hoist was not operated between the hours of 5:30 p.m. and 6:30 a.m. The actual working time was 64 hr. and idle time 104 hr., for the week.

During the week 1705 trips were made from a depth

As soon as this decision was reached and a definite cycle of operation determined, the question was turned over to the various electric companies and hoist manufacturers, and alternative proposals called for on three methods of electric hoisting; namely, the slipring induction motor with single-gear reduction, the direct-current hoist motor with synchronous motor-generator set and generator field control and, finally, the Ilgner system.

Specifications were received covering these three methods of hoisting, and after careful consideration, it



HOISTING EQUIPMENT AT NO. 5 SHAFT

of 581 ft., and the total coal consumed was 228,025 lb., of which 108,075 lb. were used in idle time, and the remainder during working hours.

ELECTRIC HOISTING WOULD PAY IF GUARANTEES COULD BE REALIZED

From the results obtained the Lehigh Coal & Navigation Co. felt that electric power for hoisting purposes would be a paying proposition, if the guarantees made by the electrical engineers could be lived up to.

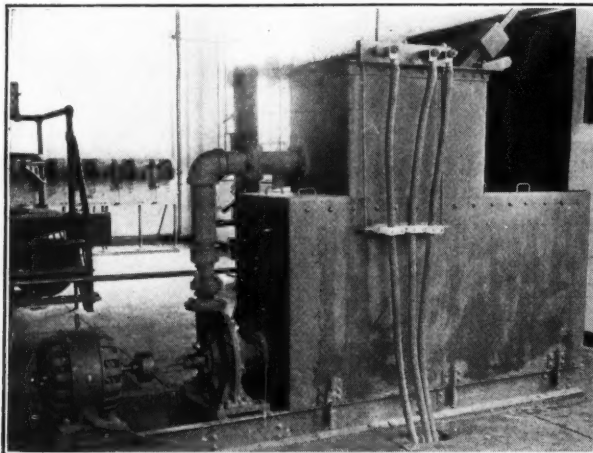
For local reasons it was decided to electrify the old No. 4 plant. This necessitated the electrification of No. 5 shaft hoist, as it was operated by steam from No. 4 boiler house, which will eventually be abandoned. The company also decided to use electricity for operating the hoist at the new No. 11 shaft.

was decided that the induction motor with single-gear reduction was best suited to meet the conditions.

The duty to be met by this hoist is as follows: Depth of shaft, 486 ft.; weight of coal per trip, 11,500 lb.; weight of cage, 11,000 lb.; weight of empty car, 5500 lb.; diameter of rope, 1½ in.; rest between hoists, 15 sec.; cars per hour, 80.

The specifications called for a motor of sufficient size to operate the hoist unbalanced if necessary, the motor to be designed of sufficient capacity to meet this condition without injury. This required a 750-hp., 300-r.p.m. slipring induction motor of particularly rugged construction operating on a 2200-volt, three-phase, 25-cycle circuit.

The selection of the proper size of motor to meet the service was comparatively easy, but the choice of the



LIQUID RHEOSTAT AT NO. 11 SHAFT



NO. 5 SHAFT HOIST HOUSE

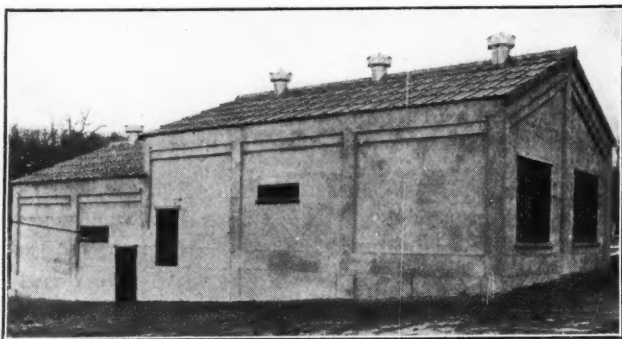
proper control to meet all the varied conditions of hoisting was a subject that required considerable thought.

It was realized by the engineers of the Lehigh Coal & Navigation Co. that no time or money should be spared to make the control of the contemplated electric hoist as perfect as it was possible to build.

THE 23 NECESSARY REQUIREMENTS

The company therefore insisted that the following 23 features should be embodied in the control of this hoist:

1. Hoist must not over-travel in either direction.
2. It must be impossible for the operator to start the hoist in wrong direction at either limit of travel.
3. Hoist must not back away due to failure of power or overload.
4. Protection must be provided against overspeed, due to any cause whatever in any position of travel.
5. Emergency brake must set and power be interrupted if operator fails to retard hoist approaching landings. This performance to be graduated and the braking effect must be adjustable to meet conditions.
6. Hoist must not start if upon return of power operator has carelessly left lever in "on" position.
7. If control circuits become grounded hoist must stop.
8. If operator fails to keep power brake in proper adjustment, emergency brakes must set and power must be interrupted, and remain so until operator has readjusted brake.
9. Hoist must be brought to rest and brake applied on loose drum before clutch can be disengaged.



NEW FIREPROOF HOIST HOUSE ERECTED BY L. C. & N. Co., LANSFORD, PENN.

10. It must be impossible to release brake on loose drum while clutch is disengaged.

11. A pawl must be provided, interlocking with clutch engine lock, this pawl to engage with loose drum before clutch can be released.

12. Inability to operate hoist unless clutch is full "in" and locked.

13. Air reservoir must not be drained due to emergency stopping of hoist.

14. There must be no delay in operation of hoist due to emergency stopping.

15. It must not be necessary for operator to call assistance in case of emergency stop, over-travel, or otherwise.

16. For operating hoist a multiplicity of levers must be avoided; two will be allowed, *i.e.*, brake and control.

17. Hoist operator must not be endangered by flying levers in emergency stopping of hoist.

18. No safety features can be dependent on the will of the operator.

19. A switch must be provided on operator's platform for an emergency stop if necessary.

20. Travel limits and speed ranges must be easily adjustable.

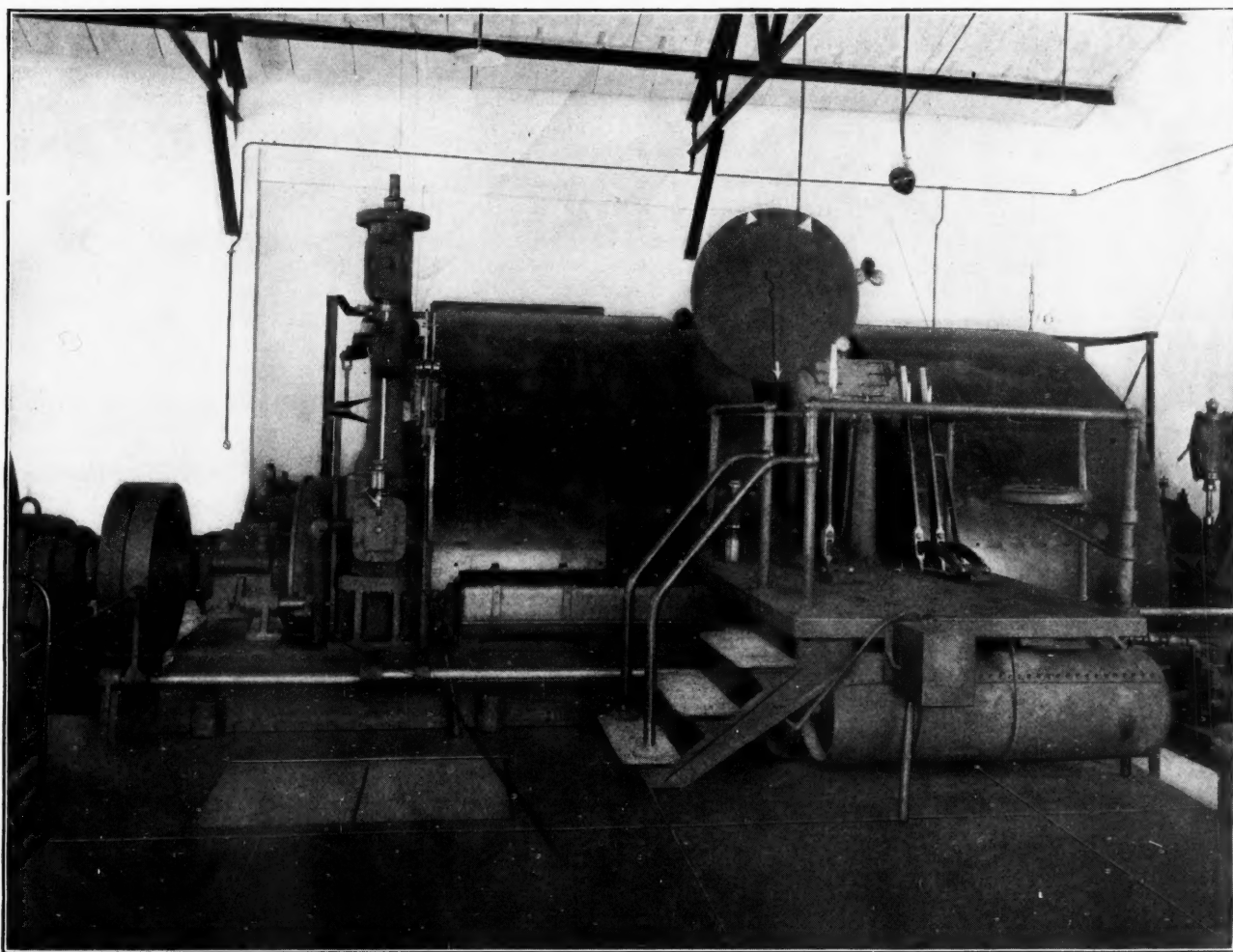
21. Current input to and acceleration of hoist motor must be governed automatically.

22. Hoist must start from rest gradually without excessive jerk and come to rest smoothly, and must be under control of the operator at all times.

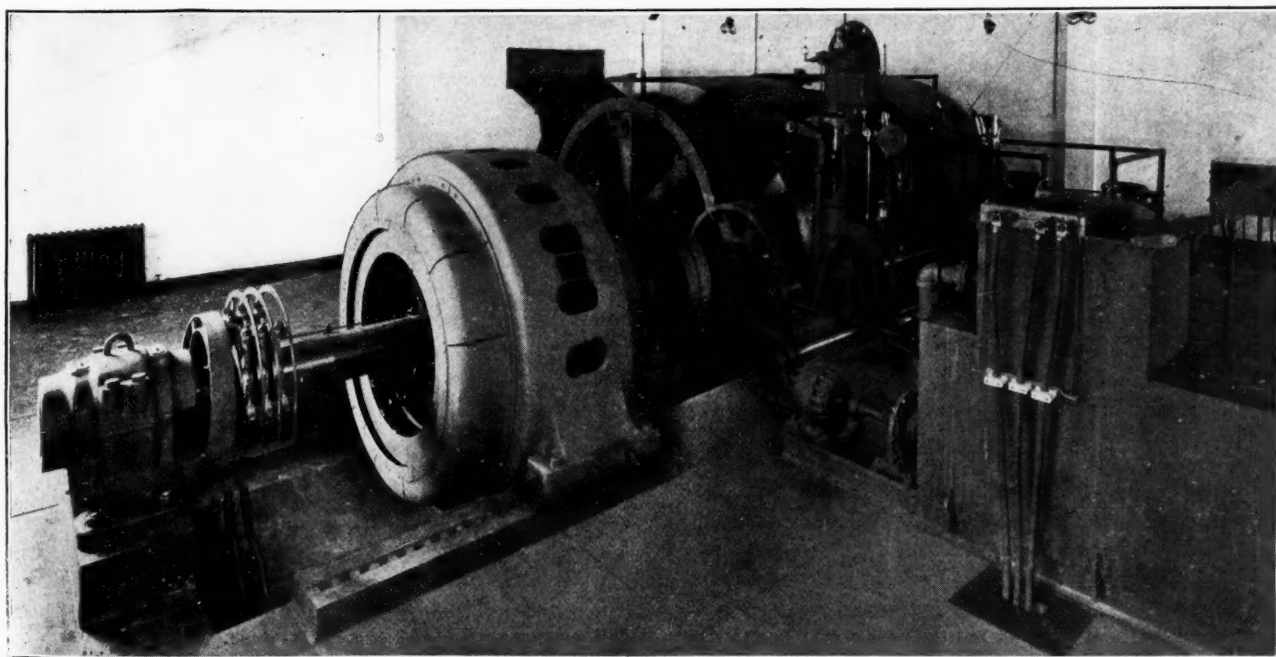
23. The speed of the hoist must be varied by cutting the resistance into or out of the rotor circuit. The rheostat must be of the liquid type and of ample capacity to meet all operative conditions.

From information the company had acquired on the use of oil-immersed contactors, it was decided that the hoist should be equipped with an air-break primary reversing switch.

In connection with the hoist proper it was necessary to provide a loose drum. It is a well known fact that numerous accidents have occurred while changing levels, due to either poor brakes or the failure of the engineer to place the cage on the landing fans while changing levels, and in view of this fact, the specifications for this hoist called for an interlocking device between the clutch engine and the pawl on the loose drum. This makes it impossible for the loose drum to move when clutch is released.



VIEW OF HOISTING INSTALLATION AT L. C. & N. Co.'s No. 11 SHAFT



ANOTHER VIEW OF THE HOIST AT No. 11 SHAFT

The hoist being of the single-reduction geared type, it was decided to equip it with cut-steel Wuest herringbone gears.

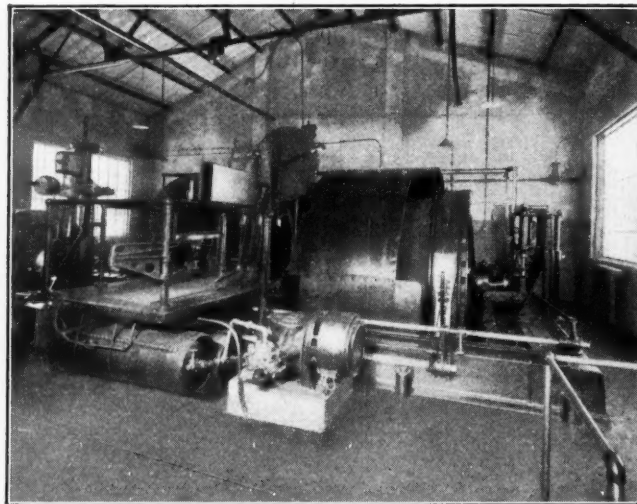
A brake on the pinion shaft was specified, this brake to work in connection with the main service brake, which was to be gravity actuated and power released. This auxiliary brake was so designed, however, that it would be impossible for it to take the full braking effort in the event of brake shoes wearing unevenly.

An auxiliary hand brake was furnished for use in case of emergency and a flexible coupling was provided of the Baehr type for connecting the motor with the pinion shaft.

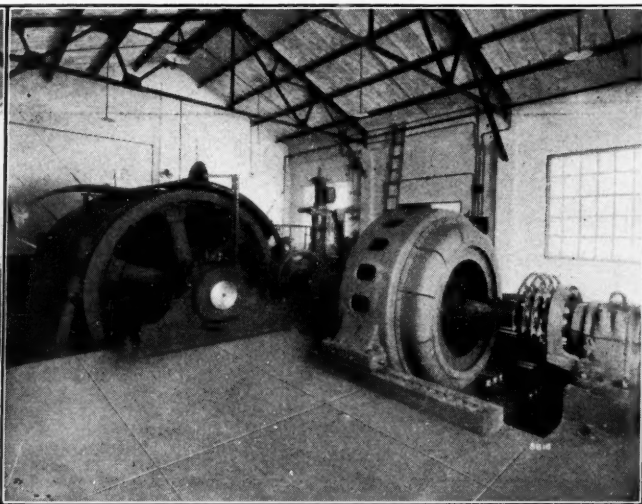
Under these specifications the contract was awarded to the Vulcan Iron Works, Wilkes-Barre, Penn., and the General Electric Co., the Vulcan Iron Works furnishing

mated; however, these extra trips average about 75 per day, which for the 23 days this hoist worked in November, 1914, would be 1725 trips. The number of cars of coal and rock hoisted, which were accurately counted, was 7704, making a total number of 9429 trips. The total input to the hoist was 37,500 kw.-hr., which would make an average per trip for the month of November, 1914, of 3.9 kw.-hr.

This result is most gratifying to the company when it is considered that to operate a hoisting engine for this duty would necessitate a boiler capacity of approximately 800 hp. This boiler would require at least three firemen and three ashmen every 24 hr., and under operating conditions for this region, the labor cost for firemen would be \$167.76, and for ashmen, \$135, making a total of \$302.76 per month. This figure of course does not in-



No. 5 SHAFT HOIST



No. 11 SHAFT HOIST

the hoist proper with special control features, and the General Electric Co. the electrical equipment.

This hoist was delivered and placed in operation on Nov. 9, 1914.

THE CHANGE OF HOISTS WAS MADE IN TWO DAYS

It might be interesting to note that the old steam hoist which had been used for this operation was situated between the new electric hoist and the shaft. On Saturday afternoon, Nov. 7, 1914, on the completion of the day's work, it was decided to change from the steam to the electric hoist. To do this it was necessary to completely dismantle the 28x60-in. hoisting engine and remove not only this machine from its foundation, but the house also, as it was directly in line with the ropes to the new hoist. This was accomplished and the new hoist placed in service at 7 o'clock Monday morning, Nov. 9, 1914.

Due to the inexperience of the operators in handling the new equipment, the output on Monday was slightly curtailed, but since that time the hoist has fulfilled all expectations, and up to the present has operated without any delay.

The control features as outlined in the specifications to the builders have been met in every particular. As it has been the practice of the company to keep an actual account of coal and rock hoisted, but not the miscellaneous trips, such as inspections, men, timber, etc., the number of these miscellaneous trips can only be esti-

clude fuel, boiler maintenance and repairs, nor depreciation on the boiler plant.

In addition to this installation a duplicate hoist was ordered for No. 11 shaft, the specifications being identical with the No. 5 hoist. This hoist with control features was built by the Vulcan Iron Works, and the electric equipment was furnished by the Westinghouse Electric & Manufacturing Co. The hoist has been installed and tested and will be put in service shortly.

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Anthracite Output Small

February was a second successive month of low anthracite production on account of the continued high temperature, which was about 6 deg. above the normal daily average for the month. As February was also a warm month of low output last year, it is probable that the amount of coal mined last month was approximately equal to that of February a year ago. The Bureau of Anthracite Coal Statistics reported shipments of 4,121,451 tons in February, 1914.

A period of heavy water has added to the expense of operating the mines, and as the warm weather has decreased the consumption of anthracite, the hard-coal industry suffers both ways. The quantity of water that must be pumped and hoisted out of the anthracite mines of Pennsylvania has increased nearly 10 per cent. in the last decade.

Determination of the Weight of Mine Locomotives

BY GRAHAM BRIGHT*

SYNOPSIS—The material composing the tread of the driver as well as the grades traversed and load handled have a considerable bearing on the necessary weight of a mine locomotive. The speed of acceleration and retardation may also be important considerations.

The weight of a mine locomotive is determined by a somewhat different set of conditions than its equipment, and the object of this article is to present some simple rules and formulæ so that a person with a fair knowledge of mining conditions can readily determine the proper locomotive to use to meet a certain set of circumstances.

The determination of the weight of a mine locomotive is a comparatively simple matter, and depends upon the loads to be handled, the frictional resistance of the cars, the length, value and direction of the grades, the rate of acceleration, the kind of wheels used, the size of the rails, the wheel base of the locomotive, and the height of the drawbar.

Where possible an actual test should be made in order to determine the average frictional resistance of the cars. This test can be made by pulling a car at a constant speed on a level track or on a track of a known grade and measuring the pull by means of a spring balance. Another method which will give the approximate friction is to find a grade down which a car will coast slowly at a constant speed without tending to increase or decrease its velocity. If this grade is say 1 per cent. then the frictional resistance of the car would be 1 per cent. of 2000 or 20 lb. per ton.

When the frictional resistance of the cars is not given it should be assumed at 30 lb. per ton unless they are newly equipped with roller bearings of an approved make. Roller bearings when installed and looked after properly, will no doubt give frictional resistance ranging from 15 to 20 lb. per ton. The writer, however, tested a number of roller bearings about three years ago which had been neglected and not properly lubricated. In this case the average resistance of several cars was 36 lb. per ton.

FRICTION GREATER WHEN PUSHING THAN WHEN PULLING

On account of the short wheel base of a mine car the friction may be considerably higher when pushed than when pulled. When a string of cars are pushed they are liable to wobble more or less, and considerable binding of the flanges against the rails may take place. When the cars are pulled they are stretched out straight and but little wobbling will take place. The frictional resistance of new cars will largely depend upon the type of bearing, while for the old cars it will be decidedly influenced by the manner in which the bearings are kept up.

The locomotive resistances will range from 12 to 20 lb. per ton. It is safe to take 15 lb. as an average since

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the friction of the locomotive is such a small percentage of the total tractive effort, and a change of several pounds in either direction will not affect the weight of the locomotive appreciably, and the effect on the capacity of the motors will be negligible.

The effect of the frictional resistance of the load will vary with the length and severity of the grades. If the track is practically level throughout, then a small change in the frictional resistance may have considerable effect on both weight and equipment. If, however, the grades are long and severe the effect will be small.

When a locomotive is operating at a constant speed on a straight, level track, the drawbar pull available for hauling a trailing load (provided there is sufficient motive power) is limited only by the adhesion that can be obtained between the driving wheels and the rails. When starting, the drawbar pull available is reduced, depending upon the rate of acceleration. As this rate is seldom more than 0.2 to 0.25 mi. per hour per second, the drawbar pull will be reduced from 19 to 24 lb. for each ton weight of locomotive.

If there are no grades the weight of the locomotive will be affected considerably by the rate of acceleration. With heavy grades, however, the acceleration will have little effect since the rate can be kept low if it becomes necessary to start on the heavy grade. Accordingly with the low rate of acceleration common to mine service this factor can be considered negligible as regards the weight of the locomotive, in view of the fact that a greater percentage of adhesion can be allowed for starting by the use of sand.

DRAWBAR PULL WITH CAST-IRON AND STEEL WHEELS

It has been found in practice that with cast-iron wheels a running drawbar pull equivalent to an adhesion of 20 per cent. of the weight on the drivers can be obtained with clean dry rails on level track, without the use of sand. A steel-tired or rolled-steel wheel seems to obtain a better grip on the rails, and a drawbar pull equivalent to an adhesion of 25 per cent. can be obtained under the same conditions. When starting heavy trips and when on steep grades it is permissible to use sand, in which case a drawbar pull equivalent to 25 to 30 per cent. for cast-iron wheels and 30 to 33½ per cent. for steel wheels can be expected.

Where grades are short the higher rates of adhesion may be used, but for long grades it is not the best practice. The writer has obtained by dynamometer tests adhesion values as high as 40 to 45 per cent. by the use of sand. The average of the tests was, however, much lower so that it is not good practice to count on such high values. These high percentages require the liberal use of sand on both rails, a practice which should not be encouraged as the sand increases the frictional resistance of the locomotive and cars, and tends to work into the bearings and gears.

Where no grades exist the weight of the locomotive should therefore be five times the drawbar pull for cast-iron wheels and four times for steel wheels, unless the

rate of acceleration is such that additional weight is required. When, however, a locomotive with a trailing load is ascending a grade the drawbar pull is necessarily greater than that required to overcome the friction of the trailing load as the weight of the load has to be lifted up the grade. For every one per cent. grade 20 lb. per ton should be added to the drawbar pull required on straight level track since 20 is one per cent. of 2000 lb.

The effect of the grade on the locomotive as well as on the load must be considered. The heavier the grade the less will be the drawbar pull of a locomotive. This becomes evident when an abnormal grade is considered on which a locomotive will be barely able to propel itself, and if any trailing load is added the wheels will slip. The greater tendency for the wheels to slip on a grade is due to the increased tractive effort necessary to propel the locomotive itself and the weight transfer due to grade.

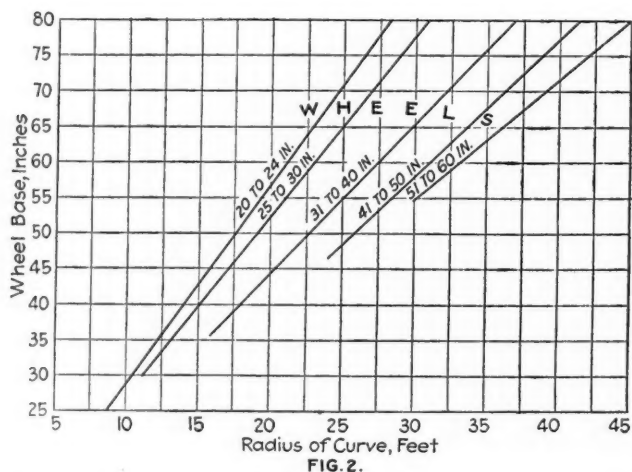
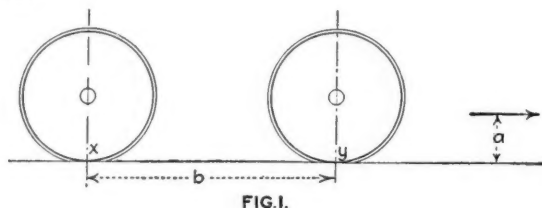


FIG. 1. ILLUSTRATES HEIGHT OF DRAWBAR AND WHEEL BASE. FIG. 2. SHOWS RELATION BETWEEN WHEEL BASE AND RADIUS OF CURVATURE

The weight transfer due to grade will depend on the wheel base and height of the center of gravity. With a short wheel base and a high center of gravity the weight transfer will be considerable. The modern mine locomotive is, however, constructed with a low center of gravity and a fairly long wheel base so that with the ordinary grades encountered the weight transfer is not serious.

The weight transfer due to height of drawbar will also affect the drawbar pull if the wheel base is short and the drawbar high. In Fig. 1 a represents the height of drawbar and b the wheel base. A horizontal force at the drawbar will act as on a bell crank one of whose arms is a and the other b . If the horizontal force represented by the drawbar pull is in the direction of the arrow, an upward force will be exerted at x and a downward force at y . If the drawbar pull is represented by D then the moment about y will be Da . This mo-

ment divided by b will give the lifting force at x . The adhesion of the wheel x will of course be lessened by the lifting force.

Assume a locomotive weighing 12 tons with a wheel base of 5 ft. and the height of drawbar 10 in. At 25 per cent. adhesion Da will be $6000 \times \frac{10}{12} = 5000$ ft.lb. The upward pull at x will be $5000 \div 5 = 1000$ lb. The normal weight at x is 12,000 lb. therefore the weight when the drawbar pull is 6000 lb. will be 11,000 lb. so that the adhesion will be $\frac{3000}{11000} = 27.2$ per cent. It is thus to be seen that with the ordinary height of drawbar and wheel base the drawbar pull is not seriously affected. In metal mining a much higher drawbar is sometimes required so that the wheel base must be lengthened to lessen the tilting effect.

By tying the axles together by means of side rods, chains or gears the effect of weight transfer due to grade and height of drawbar can be eliminated, but these devices have not proven successful from an operating standpoint.

HOW TO DETERMINE THE WEIGHT OF A LOCOMOTIVE

Since the weight of the locomotive must be known before the amount necessary to add to the tractive effort for acceleration and grade can be figured, it is best to use a simple formula to determine the weight of the locomotive:

$$W = \frac{5 \times FA}{2000} = \frac{FA}{400}$$

for cast-iron wheels on a straight level track.

$$W = \frac{4 \times FA}{2000} = \frac{FA}{500}$$

for steel wheels on a straight level track.

$$FA + 20 \times G \times A + 20 \times G \times W = 400 W$$

for cast-iron wheels on a grade.

$$FA + 20 \times G \times A + 20 \times G \times W = 500 W \text{ for steel wheels on a grade.}$$

W = Weight of locomotive in tons.

A = Weight of trailing load in tons.

G = Grade in per cent.

F = Frictional resistance of trailing loads in pounds per ton.

In the above equations the term FA is the drawbar pull on straight level track; $20 \times G \times A$ is the added drawbar pull of the trailing load due to grade; $20 \times G \times W$ is the added tractive effort of the locomotive due to grade and the drawbar pull of the locomotive is lessened by this amount when compared with level track; $400 W$ and $500 W$ represent 20 per cent. and 25 per cent. adhesion for cast-iron and steel wheels.

The application of these equations can be better understood by considering an actual example. Assume a trip of 30 cars weighing 4 tons each including the load. The trailing load will therefore be 120 tons. Assume the frictional resistance of the cars to be 30 lb. per ton. Then on a straight level track:

$$W = \frac{30 A}{400} = \frac{3600}{400} = 9 \text{ tons for cast iron wheels}$$

$$W = \frac{30 A}{500} = \frac{3600}{500} = 7.2 \text{ tons for steel wheels}$$

On a one per cent. grade the weight will be:
 $30 \times 120 + 20 \times 1 \times 120 + 20 \times 1 \times W = 400 W$
 or $W = 18.4$ tons for cast-iron wheels.

$$30 \times 120 + 20 \times 1 \times 120 + 20 \times 1 \times W = 500 W$$

or $W = 14.6$ tons for steel wheels.

On a 3 per cent grade the weight will be:

$$30 \times 120 + 20 \times 3 \times 120 + 20 \times 3 \times W = 400 W$$

or $W = 31.7$ for cast-iron wheels.

$$30 \times 120 + 20 \times 3 \times 120 + 20 \times 3 \times W = 500 W$$

or $W = 24.5$ for steel wheels.

The above figures show a decided advantage of steel wheels over cast iron, and is one of the reasons why they are becoming more popular. Steel wheels cost more than cast iron and should have a little more clearance allowed to take care of the wear. The extra cost is, however, more than compensated by the added adhesion available. Steel-tired wheels may be trued up about two times before it becomes necessary to replace the tires.

The above figures also show that grades may become the principal feature in determining the weight of the locomotive. For this reason the length and percentage of each grade should be determined and also the length of the cars. Mine cars will range from 7 to 10 ft. long so that a trip of 70 to 80 cars will range from 500 to 800 ft. in length. In many instances severe grades are only 200 to 300 ft. long, in which case only a portion of the load may be on the grade at one time, consequently a much lighter locomotive could be used than if the steep grades were as long or longer than the trip.

In some cases the operating conditions are such that loads are handled down the grade, while the cars are always empty on the return up grade. This often means that safe braking conditions require a heavier weight of locomotive than is necessary to ascend the grade with the empty cars. If the grades are short and without sharp curves at the base it is not so important to figure closely. However, when the grades are long and severe or have sharp curves at their base, the weight of locomotive should be figured in a manner similar to that in the above formula, except that the formula will be modified to subtract the frictional resistance of the load, since it assists the braking. The formula will then be:

$$20 \times G \times A + 20 \times G \times W - FA = 400 W \text{ for cast-iron wheels.}$$

$$20 \times G \times A + 20 \times G \times W - FA = 500 W \text{ for steel wheels.}$$

In case the grade, curve and track conditions are very bad, and the question of safe handling down the grade is paramount then the adhesion factors of 20 per cent. for cast-iron wheels and 25 per cent. for steel wheels should be decreased to suit the particular case. Fairly safe figures to use are 15 per cent. for cast-iron and 18 to 20 per cent. for steel wheels.

SHORT RUNS REQUIRE A HEAVIER LOCOMOTIVE

Occasionally a locomotive is required for service which consists of short runs with quick starts. In this service, the weight of the locomotive will have to be increased.

The unit of acceleration is generally taken at an increase in speed of one mile per hour for each second of time; i.e., if the rate of acceleration is 0.5 mile per hour per second, the increase in speed at the end of ten seconds will be 5 miles per hour. To accelerate a ton of dead weight at the rate of one mile per hour per second, a force of 91.3 lb. above the frictional resistance must be applied.

This figure is obtained as follows: The force of gravity accelerates a given weight at the rate of 32.2 ft. per

second per second. A rate of one mile per hour per second, is equivalent to 1.46 ft. per second per second. It will therefore require a force of $1.46 \div 32.2$ times the weight of a body to produce an acceleration of one mile per hour per second, or $1.46 \div 32.2 \times 2000 = 91.3$ lb. per ton.

Since a locomotive has rotative as well as translative inertia the value 91.3 will be increased by an amount depending upon the speed and radius of gyration of the rotating parts. A safe figure to use for a mine locomotive and trip of cars would be about 95 lb. per ton. In mine and industrial work where the speeds are from 6 to 8 miles per hour, the rate of acceleration is, as a rule, taken at from 0.1 to 0.2 miles per hour per second.

If high rates of acceleration and retardation are to be used the weight formula will be as follows:

$$FA + 95 B (A + W) = 600 W \text{ for cast-iron wheels on level track.}$$

$$FA + 20 G (A + W) \times 95 B (A + W) = 600 W \text{ accelerating up a grade.}$$

Bringing trip to a stop on a down grade,

$$FA + 20 G (A + W) + 95 B (A + W) = 400 W.$$

Here B is the rate of retardation in miles per hour per second.

For steel-tired wheels, 666 W can be used on level and up grades, while 500 W should be used on down grades. The values 400 W , 500 W , etc., should be selected according to the service conditions.

The resistance of curves can be neglected, as a rule, unless they are long or have a short radius. Ordinarily only a small portion of the train will be on the curve at one time so that the drawbar pull to be added should be calculated on the basis of the number of cars that can be placed on the curve simultaneously. The number of pounds per ton to be added for curves will average 0.5 lb. per ton per degree (about 0.3, however, for short curves with the gage spread). The value of a curve in degrees can be obtained by dividing 5730 by the radius of the curve in feet.

Care should be taken that the wheel base is not too great for the curve of the track. Fig. 2 shows the relation between wheel base and radius of curvature and from this curve one can readily determine the minimum curve that a locomotive with a given wheel base can safely negotiate.

Sometimes the weight of the locomotive figures out much too heavy for the weight of rails used in the proposition under consideration. If it is impractical to change the rails, the alternative is to reduce the number of cars per trip, so that the weight of the locomotive can be reduced. A larger number of locomotives of the smaller type will then be required, but the cost of operation may be reduced by coupling them in tandem so that only one operator is required for two machines. In this way full trips can be handled.

The following table gives safe practice regarding the proper weight of rail which should be used for various weights of locomotives:

Locomotive Weight on Two Pairs of Wheels, Tons	Weight of Rail, Lb. per Yard
4 to 6	16
6 to 8	20
8 to 10	25
10 to 13	30
13 to 15	40
15 to 20	50

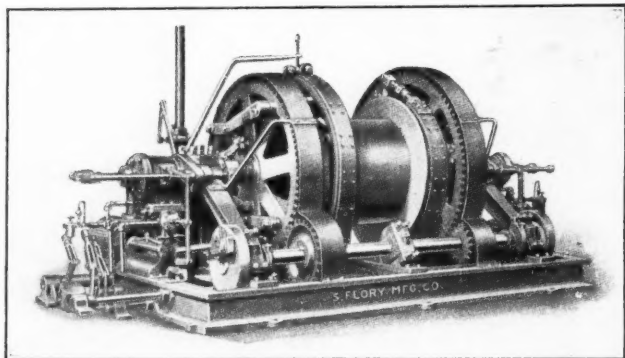
An Improved Type of Two-Speed Hoisting and Haulage Engine

BY J. E. WERNER*

During the many years that hoisting and haulage engines have been in use, manufacturers have made many kinds of machines to meet the various requirements. These hoists may be classified according to the relation of the drum location to the driving mechanism, that is, direct drive, single geared, compound geared and two speed. They may be driven by steam, air or electricity.

In numerous mining and contracting operations, it has become necessary to install two-speed hoists, in order that the same machine may be used for pulling loads over different grades. The load on a hoist increases as does the pitch of the grade. In order to maintain the horsepower constant an abrupt increase in grade should be accompanied by a decrease in the rope speed so that a change of gear ratio is desirable.

Until recently, this change of speed was made by means of sliding pinions, or jaw clutches engaging in pinions,



A FLORY HOIST DESIGNED FOR COAL-MINING SERVICE

the latter driving the drum gears. In order to shift these pinions or clutches, thereby increasing or decreasing the rope speed, the revolving parts are entirely stopped, or moved slowly, so that these parts may be properly engaged. This causes loss of time and also requires skill on the part of the operator.

In view of the fact that delays and experienced operators are important factors in production costs and that users of hoists aim to reduce expense to a minimum, an improved type of two-speed hoist has been put on the market, which eliminates jaw clutches, sliding pinions, extra shafts, bearings, etc. permitting the speeds to be changed instantly and requiring no experienced operator.

This improved type of hoist as illustrated herewith is built both for steam and electric power. It is a combination of two Werner type band friction clutches operating on the same drum shaft. The two-speed arrangement is made by means of two different-sized gears driving the drum and meshing in relative sized pinions.

Since the speed of rotation of the pinion shaft remains constant, the operator at will can increase or decrease the revolutions per minute of the drum by throwing the friction clutches on the small or large gears, respectively.

The construction is simple, easily adjusted, and operated with slight exertion on the part of the driver. The

friction bands are thrown on or off by means of steam- or air-cylinder thrusts controlled by a slight movement of levers placed in a battery. These thrusts are actuated by regulating valves, while the speed of the piston travel in the cylinder is governed by small exhaust check valves.

The principal advantage of the Werner type band friction clutch is that the stress from the drum is transmitted through the bands directly to the teeth of the gears, instead of through the drum shaft, as is the usual practice. The torsional stresses set up in the drum shaft are thus eliminated.

The heavy-duty gear is secured to, while that for light duty revolves on the drum shaft. These gears with their corresponding frictions are controlled by separate levers, so that either clutch can be thrown on or off while the gears are in motion, thus saving time in stopping and starting. Users find this feature both advantageous and economical.

The friction-clutch combination is simple, consisting of a sliding sleeve on the drum shaft, connected by links to two sliding crossheads fitted in guides, so that by moving the sleeve parallel to the shaft the crossheads move at right angles to the same.

These crossheads are connected to a series of levers, two moving on trunnions, and two keyed to rocker shafts. One end of the rocker shaft carries a double stub, to which the friction bands are fastened. By moving the sleeve in or out along the drum shaft, the bands are thrown on or off.

This type of two-speed hoist, which is built by the S. Flory Manufacturing Co., Bangor, Penn., has been on the market for several years and has proved itself to be highly efficient for mining and contracting operations.

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Extracts from a Superintendent's Diary

A weary, dejected Belgian came into my office today and insisted that our company was badly in need of his services at the coke ovens, in spite of the fact that our coke-oven foreman had told him that he was laying off men every day and could positively not think of employing new men. The man was so persistent in his efforts to obtain an interview with me that I could not refuse him a hearing in spite of the apparent hopelessness of his case.

Judging by his English, he had been in this country several months at least, as he had little trouble in making himself understood.

Without wasting any time on preliminaries, he informed me in the most brusque manner imaginable that we needed him to lute our oven doors. He said that we didn't have a man on the job who knew the first thing about luting ovens, and for that matter he hadn't seen one who did since he left Belgium. Then he went on to explain that luting ovens in Belgium was only intrusted to men who had been trained to the work from childhood, generally by their fathers who had been luters also.

A man fitted for a life work under such conditions took great pride in his work; for example, if several luters were employed on one battery, each man carried a marking stick to put a distinguishing mark on each door, so that if a question ever arose as to any particular door he could protect himself. During his recital I tried to imagine one of our door daubers resenting an accusation

*Chief draftsman, S. Flory Mfg. Co., Bangor, Penn.

that one of his "buddies" was doing better work than he, but I couldn't stretch my imagination that far.

Then he went on to say that he had been to several by-product plants in this country and found that they used expensive doors that didn't require skilled luters, and when he had inquired into the reason for such unnecessary expenditures, he was told that they could not use the simpler doors so successfully used in European byproduct practice because they could not get the right kind of men to handle them. One very frank superintendent, who had traveled much in Europe, had informed him that the mechanical labor-saving inventions, so common in America, were a matter of necessity and in reality should be considered as a reflection on the skill of American workingmen.

This intimation that European workingmen can accomplish tasks beyond our own men aroused my curiosity, and I could not resist the temptation to send for our coke-oven foreman and request that he reconsider the Belgian's application. I want to see what effect common everyday American clay, hand mixed for daubing purposes, will have on a true artist.

The Belgian's advent recalled to my mind an experience we had with a dauber several years ago. The fellow came into my office after wandering around the camp and suggested that he could increase our coke yield by improving our system of drafting. We employed him and gave him a free hand. After a few days he decided that the clay which we had been using was not suitable, and he experimented with various nearby clay banks. Six months passed and then he suddenly disappeared. Shortly thereafter a farmer entered a suit against us for using clay from his farm without his permission or knowledge. Our legal department settled the suit out of court by agreeing that clay taken under such circumstances should be considered almost as valuable as gold.

We never were able to learn whether the mysterious dauber got any of the settlement money, but if he didn't, we certainly owe his memory an apology.

Mining Fatalities in West Virginia Show Decrease

The list of fatalities in the coal mines of West Virginia during the month of January has just been issued by the Department of Mines, and shows that 22 workmen were killed during the month, as compared with 37 in January, 1914, and 29 during the preceding month. Of this number two died from injuries received in previous months, reducing the total to twenty.

While the usual percentage of deaths was due to carelessness and disobedience to mine rules, the decrease is most gratifying, and especially in McDowell County, the heaviest coal-producing county in the state, where only three fatalities were reported during the month. Of the others, five were reported from Fayette County, three from Marion, two each from Mineral, Raleigh and Logan, and one each from Brooke, Kanawha, Mercer, Mingo and Upshur counties.

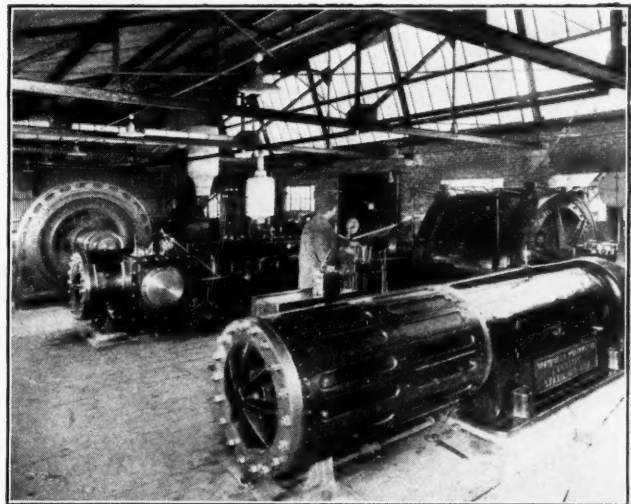
A classification of the fatalities shows that 11 met death from falls of roof and coal, 2 from railroad cars, 4 from mine cars, 1 from locomotives, 1 from a monitor, 1 by electrocution, 1 by explosives and 1 from an unclassified cause. Four occurred outside the mines. Of the men killed 14 were Americans and 8 foreigners.

A New Hoisting Engine

To meet the ever increasing demand for greater output in coal mining and to lessen the manual labor of handling the heavier machinery required therefor together with increased weight and strength to resist the shock to which mine hoists are always subjected, a new hoisting engine has been introduced by the Crawford & McCrimmon Co., Brazil, Ind.

In this design the important parts exposed to excessive stress are made of steel, while the valves and valve gear are of an improved type in which the valves are perfectly balanced and at the same time free to tip upon a slight back pressure, thus relieving the cylinders from the danger incident to a slug of water which may be pulled over from the boilers.

The hard work devolving upon the engineer in handling large engines of the ordinary type with their heavy link motions and balance weights is largely mitigated in this design by the application of a new link motion which



HOISTING PLANT OF AMERICAN COAL MINING CO.,
BICKNELL, INDIANA

embodies a stationary link not shifted on reversal of the engine, but only the link block and its radius valve rod, which are light and easy to handle.

The machine is provided with a steam reverse and a steam brake in addition to an emergency brake. A new throttle valve is supplied, in which a differential lever motion is employed and a toggle pressure applied in closing.

The cylinders are fitted with large ports and the main valves are double ported. The ease and freedom with which these valves may be tipped up in an emergency obviates any necessity for pop safety release valves on the cylinders.

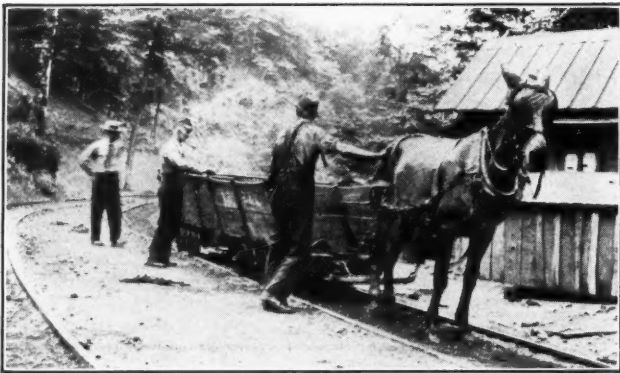
In the makeup of the winding drums the spiders through which the whole power is transmitted are made of steel in two halves and are double keyed to the shaft. The connecting-rods are of forged steel with solid ends. The crossheads are also of steel casting. The piston rods are metallic packed and the operating levers are all conveniently grouped. The whole design is intended to make the engine not only durable in operation but easy to handle, both of which considerations tend toward large output.

Gasoline Mine Haulage as Compared with Mule Haulage

SYNOPSIS—Comparison of costs of coal transportation with mules and with a gasoline locomotive showed a difference in favor of the mechanical haulage of 19.17c. per ton mile. The yearly saving effected is estimated as \$3372 while the output was materially increased.

The advance of mechanical equipment in the field of coal transportation at the mine is causing the mine mule to disappear, and the prediction is sometimes made that within a few years the mule will have practically vanished from the larger operations. The number of these animals now employed is already on the decrease, and the rapidity with which they are being supplanted with mechanical apparatus gives weight to the above prediction.

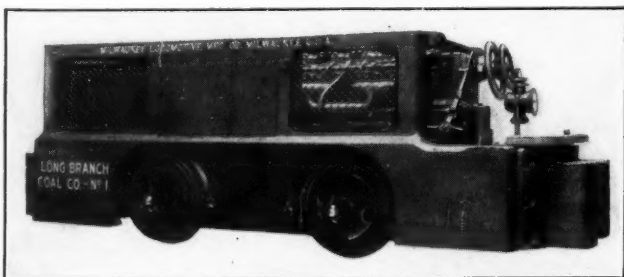
The mule has long been a factor in the haulage problem and one of the chief items of expense at the mines. In



A MINE MULE NOW USED ONLY IN GATHERING

order to show a profit the operator must get his coal onto the railroad cars in the cheapest manner compatible with prompt shipment. The mule-drawn car is a relic of the past, and that it must go is apparent since it has been demonstrated that mechanical haulage is cheaper and, all things considered, more efficient.

In the banishment of the mule from American mines, gasoline promises to be an important factor. The present is often referred to as the gasoline age, and it is certain



THE GASOLINE ENGINE EMPLOYED FOR HAULAGE

that this fuel is coming to be one of the most generally used sources of power and locomotion.

One of the best illustrations of these facts obtainable anywhere is to be found in the operation of the Long Branch Coal Co. at Long Branch, Fayette County, W. Va. Here gasoline haulage has greatly reduced the

expense of coal transportation even while the output has been materially increased. The mine in question is owned and operated by the above mentioned company headed by P. M. Snyder, the land being leased from the Snyder-Boom Co. It is under the direct management of L. Graney, one of the youngest men in the state to occupy the position of manager. It is a new mine, but has been placed on an effective operating basis and is now working full time whenever railroad cars can be secured.

The supplanting of the old system of mule haulage was done in 1913 with the idea of cutting down operating costs. The company purchased a Milwaukee M-35, 7-ton gasoline locomotive. This was put into service in the summer of 1913. At the end of the month of August, a comparison was made with the month of February, the most productive month during the régime of mule haulage. A summary of this comparison is given below:

COMPARATIVE COSTS OF THE TWO SYSTEMS OF HAULAGE

Total cost of mule haulage, per month.....	\$810.00
Total cost of gasoline haulage, per month.....	529.63
Decrease in haulage cost, per month.....	\$280.37
Total coal tonnage by gasoline locomotive, tons.....	11,601
Total coal tonnage by mules, tons.....	7,848
Increase in coal output, tons.....	3,753

The analysis of the above summary is shown by the following detail comparison between the cost of haulage by mules and by a combination of gasoline locomotive and mules for gathering.

Mule Haulage—Month of Feb., 1913

Length of haul one way, ft.....	2000
Maximum grade against loads, %.....	5.625
Average grade against loads, %.....	3.0
Total tonnage per month of 24 days.....	7848
15 mules—feed and upkeep per day @ \$.60.....	\$9.00
11 drivers—wages per day @ \$2.25.....	24.75

24 working days @ \$33.75—cost per month.....	\$810.00
Total haulage cost per ton of coal.....	0.103
Total haulage cost per ton mile.....	0.272

Gasoline Locomotive Haulage in Connection with Gathering by Mules—Month of August, 1913

Length of haul one way, ft.....	3000
Maximum grade against loads, %.....	5.625
Average grade against loads, %.....	3.0
Total tonnage per month of 25 days.....	11,601
Expense of mules and drivers for gathering, 25 working days.....	\$313.20

COST OF OPERATING LOCOMOTIVE 25 DAYS

1 motorman @ \$3.00 per day.....	\$75.00
1 trip rider @ \$2.00 per day.....	50.00
300 gal. gasoline @ \$.20 per gal.....	60.00
38 gal. engine oil @ \$.40 per gal.....	15.20
3 gal. black oil @ \$.16 per gal.....	0.48
Cup grease.....	0.50
Waste.....	0.25
Repairs on motor.....	15.00

Total operating expense of locomotive.....	\$216.43
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Total haulage cost per month.....	\$529.63
Total haulage cost per ton of coal.....	0.0456
Total haulage cost per ton mile.....	0.0803
Cost per ton of coal—mule haulage.....	0.103
Cost per ton of coal—locomotive haulage.....	0.0456

Saving per ton of coal.....	\$0.0574
Cost per ton mile—mule haulage.....	\$0.272
Cost per ton mile—locomotive haulage.....	0.0803

Saving per ton mile.....	\$0.1917
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On a basis of 12 months the cost by mule haulage for one year (\$810 × 12).....	\$9720.00
By locomotive for one year (\$529 × 12).....	6348.00

Yearly saving.....	\$3372.00
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In short, with the gasoline haulage system the tonnage of the mine has been increased on an average of 25 per cent. per month, and the company has dispensed with 6 double teams or 12 mules and 6 drivers, a total monthly saving in expense of \$496.80.

The hauling is not yet entirely accomplished by gasoline motors, as the mules are still used for gathering. The mine tracks are to be extended, in order that the more satisfactory and cheaper service of the locomotive can be taken advantage of to the greatest possible extent.

So satisfactory were the results with the gasoline locomotive that the management of the company installed a second machine the following year, and now have both in operation.

The particular locomotive referred to above is classified by the manufacturers as an "M-35," 7-ton, 42-in. gage machine, and in the above work handled 8 loaded mine cars at a trip, each car carrying $1\frac{3}{4}$ tons of coal. The coal is hauled from three partings.

At the mouth of the mine the locomotive drops the loads at the head of a 2100-ft. incline and goes back with the empties. The incline handles 5 cars at a trip, and works on the gravity principle, the loaded cars on their descent pulling the empties back up the mountain side. At the foot of the incline the cars are taken down a tram-road, 4100 ft. to a tippie on the Virginian R.R. This tippie is capable of handling 1200 tons of coal daily.

Economy in Mine Haulage

By R. S. RICHARDS*

SYNOPSIS—Although horses and mules have in the past been used to a considerable extent for transporting coal underground, their place is now being taken by locomotives. Storage-battery machines in this service reduce the costs of coal moving about three-fifths.

Economy in mine haulage is a subject which has been, and will continue to be, much discussed among mining men. The competition of the present day renders it im-

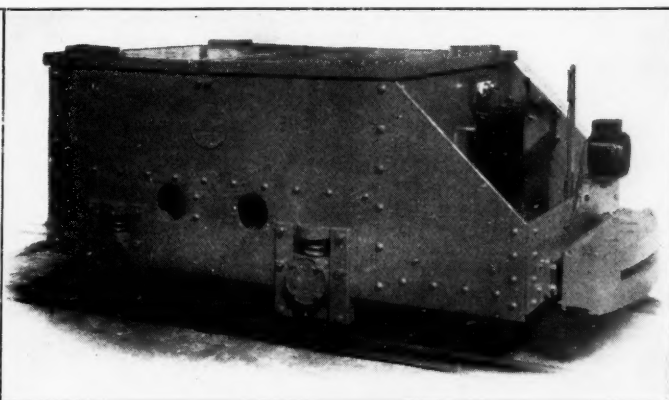
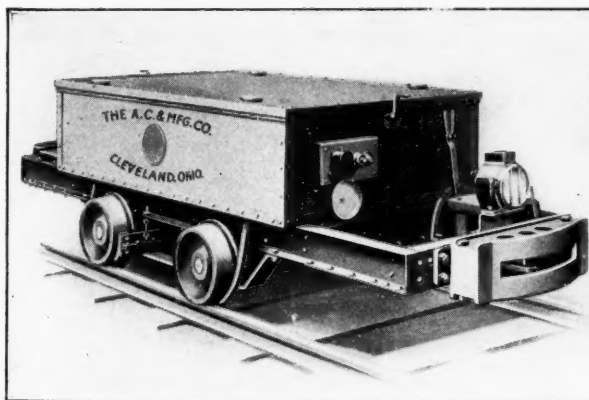
There are four general types of locomotives employed in and about the mines. These may be classified, according to their driving power, as steam, compressed-air, gasoline and electric. The steam-driven machine has many objectionable features which render it unsuited to employment underground, chief among these is the large volume of smoke and gas given off by the fire. Compressed-air locomotives emit no noxious gases. They are not, however, employed to as great an extent as some other types.

The gasoline locomotive has found favor in some locations, but the presence of the exhaust gases, as well as the sparks sometimes accompanying them, render their use objectionable under certain conditions. Furthermore, the gasoline engine has not yet been brought to that state of perfection where it may be absolutely relied upon under all circumstances.

Electricity is used for power or lighting in a large percentage of mines. The current may be obtained either from a private source or purchased from a central company. To extend the use of current to the propulsion of electric locomotives would not require any considerable expenditure, the bonding of the rails and stringing of the trolley wires being the most important items to be considered.

THE THREE TYPES OF ELECTRIC LOCOMOTIVES

Generally speaking, electric locomotives may be divided into three classes or types: the trolley type, the storage-battery and the combination trolley and storage-battery varieties. Where the mine is already provided with elec-



TWO DISTINCT TYPES OF STORAGE-BATTERY LOCOMOTIVES

perative that the operator who would dispose of his product profitably must give transportation of coal in and around the mine his closest attention.

Mules and horses have long been used for the propulsion of mine cars. In the larger and more progressive mines of today, however, they have been supplanted in large measure by the locomotive. Horses and mules require feed and bedding, which is a considerable item of expense. Furthermore, they must have shoes, harness and occasional medical attention. The life of an animal in this service is limited, due to the unfavorable conditions under which he has to work, the class of work performed and the inevitable accidents. Good drivers are difficult to secure, as most competent men prefer work which returns a greater remuneration. But, above all else, the tonnage handled is not entirely satisfactory.

*10522 Olivet Ave., Cleveland, Ohio.

tric current, the trolley type is the more economical, especially on long hauls. The danger from the trolley, however, must not be lost sight of.

The storage-battery locomotives now on the market are giving excellent results and are especially desirable for remote mines where a continuous supply of electricity is not obtainable. While a current for charging the storage battery is, of course, necessary, this can be produced by a small generator, which represents only a slight investment. Where the mine is already equipped for trolley locomotives, those of the storage-battery type may in many cases still be used to considerable advantage. At those mines where the power plant is loaded well up to its capacity, the storage-battery locomotive finds its special value, as the current for driving the machines may be obtained at night or at other times when the generator is not running under full load.

For cross-entry and room work, probably no form of haulage system can surpass for economy and convenience the storage-battery locomotive, hence, the expense and annoyance of the gathering cable are done away with. No trolley wire or other conductor is required and the bonding of rails is unnecessary.

Tests in various mines have shown that the average cost of gathering with storage-battery locomotives is about 2c. per ton as against 4 to 5c. with mule haulage. Where operators are forced to sell their product at a profit of only 5c. per ton, and many are at the present time selling it at cost, or even less, this saving is a considerable item. If the machine is equipped with a reliable storage battery and is properly constructed, the purchaser need have no fear concerning its operation. Such machines are easily cared for and are practically foolproof.

The combination type of locomotive is merely a combination of the trolley and storage-battery machines. It finds its greatest application where a general-utility locomotive is desired.

The Labor Situation

SYNOPSIS—*The northeastern Ohio situation shows no change. A strike in Fayette County, the Jamison strike in Marion County, and the trouble at Ronda and Dry Branch focus attention on West Virginia. A strike in Kentucky shows signs of coming to a speedy end.*

The report of D. J. Keefe and Hywel Davies on the northeastern Ohio strike apparently has been held back in the hope of a settlement. John P. White, the president of the United Mine Workers of America, William Green, the secretary-treasurer of that organization and several members of the Pittsburgh Vein Operators Association have met with Secretary of Labor Wilson, and have tried to forestall the report with a settlement. On Mar. 2 the report was formally delivered.

It is said to state that the operators offered to accept the report of the conciliators as final and binding. This the miners refused. The operators then offered to leave the matter to arbitrators, allowing the conciliators to choose the arbitrators. The miners again refused, offering to arbitrate provided the mines resumed work at the increased wages demanded by the miners and that umpires be appointed by miners and operators. The operators refused to accept this arrangement, as a disagreement between operators and miners in regard to the appointment of umpires would effectually block the arbitration.

Arbitration Not Desired by Eastern Ohio Miners

The operators then offered to arbitrate, providing that the nonpartisan umpires should be selected by the judges of the northern district of Ohio. The miners again refused. The operators then proposed arbitration with umpires selected by the President of the United States. Again the miners demurred, and finally the secretary-treasurer, William Green, withdrew the agreement of the union officials to submit the differences to arbitration and stated that the only settlement that the union would accept was one which conceded the original demands of the miners. So, after all, no good resulted from a conference into which the union men never entered in good faith.

They promised the legislature when the Green bill was passed that they would not increase the price of coal. Now they are trying to increase its cost by 2.39c. per ton. The actual increase, which is larger, is, of course, difficult to gage. Its amount is dependent on the amount of slack coal which careless mining will make.

Some Believe Strike Near Settlement

There are some who believe that the strike may be settled by arbitration, despite the refusal of the miners to accept that mode of settlement. Such prognosticators draw hope from the conference now called by the Secretary of Labor. It is intimated that he will urge upon the miners the necessity for arbitration and that President Wilson

may be called upon to name the arbitrators. It is understood that the proposal submitted by the operators at the last Cleveland conference still stands. This provided that the miners name three members of the board, the operators three and the judges of the federal court of the northern Ohio district the other three, the board to consist of nine members.

Some think that Secretary Wilson has not made public the contents of the report, because he believes that there is yet some chance for settlement of the strike and that the publication of the document might prejudice the situation. The proposal of the operators for arbitration follows:

In accordance with the understanding at the adjournment last Thursday that three names be submitted by the operators of eastern Ohio to constitute part of an arbitration board for the purpose of deciding the matters in dispute which have resulted in the past ten months' strike in the mines of eastern Ohio we have selected and herewith submit the names of C. E. Maurer, S. P. Robbins and G. M. Jones.

These names are submitted with the understanding that they, together with three members selected by the miners, shall choose three disinterested members, who shall constitute a complete arbitration board of nine members and that the decision of this board shall be final and binding on both the operators and miners.

In the event that the members selected by the operators and miners are unable to agree on the election of the three disinterested members within three days from date, then we agree that the said disinterested members shall be appointed by the President of the United States.

As we go to press, we learn that the meeting at Washington has been held and that the conference was suspended, so that the miners' leaders might have time to return to Ohio and confer on the proposals made to them.

Three Centers of Unrest in West Virginia

The interest in the labor situation has shifted in some degree to West Virginia. Apparently the Jamison Coal Co. did not cease its practice of supplying the miners with powder without promising compensation. This is said to have amounted to 4c. on the car. Apparently the strike is not spreading as was anticipated. The authorities are working hard to reduce the illicit selling of whisky, some men having tried to smuggle in 20 gal. on Feb. 22.

The Ronda and Dry Branch strike seems to be nearing a compromise. It is only the gas coal which makes an excessive amount of slack, and it is only in regard to this that the question of scale arises.

Fifteen thousand men in the Fayetteville district are seeking a 10 per cent. increase in wages on all mining and day work, and demand that dues and assessments be checked off at the office. They also demand a 9-hr. day and the free use of a building in which to hold the meetings of the local union.

The union men deposed President L. C. Rogers and seven other officers on charges of using the funds of the United Mine Workers of America to secure their election, and for "other wrongful and fraudulent acts." The International Executive Board will investigate the charges.

Du Pont Company Arranges Its Labor Troubles

In a telegram to S. J. Gish, president of the Central Coal & Iron Co., of Central City, Ky., a Du Pont corporation, John P. White, president of the United Mine Workers of America, declares that the International Executive Board will suspend the order for the closing down of the mines of the company. This has been done because President Gish agreed to comply with the contract dated Apr. 1, 1914, between the Western Kentucky Operators' Association and the United Mine Workers of America, provided that in the settlement of disputed questions the company should appoint its own arbitrator in place of the commissioner of the operators' association.

In Colorado the men have been acquitted who were tried for shooting guards during the strike. The men killed were riding in an automobile at La Veta.

Success

The big SUCCESS number of COAL AGE which will be issued Apr. 3 promises to eclipse all expectations. If you have made a practice of occasionally writing for COAL AGE, your record will be incomplete should you fail to have a contribution in this particular issue. If you have been bottling up all your mining experiences, and thereby "hiding your light under a bushel," this special number of COAL AGE is by all means the appropriate time for you to make your debut in the literary field of the technical world. Get busy today and start the preparation of a SUCCESS article along the lines outlined in our foreword last week.

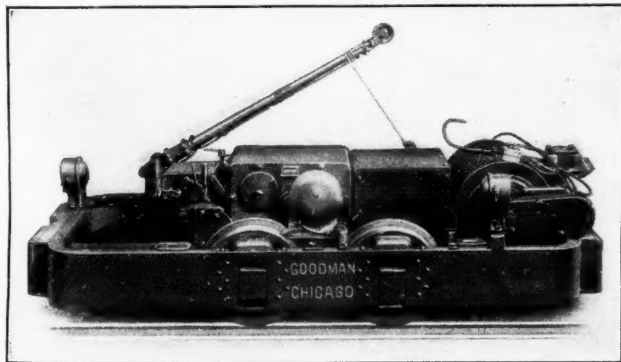
Electric Gathering Locomotives

By E. C. De Wolfe*

SYNOPSIS—In most modern mines, the gathering locomotive has replaced the mule for haulage purposes. Aside from economy considerations, the gathering locomotive is a physical necessity if large outputs are to be handled. Old mines can be equipped with such locomotives as well as newer operations. These machines have a multitude of uses.

The past ten years in bituminous mining history have been marked by no advances of greater moment than the development and wide adoption of locomotives for gathering, as auxiliary to the main haulage system in performing the "mule" service of distributing the empty cars to the miners and making up the loads into trips for hauling out. Arguments for and against the use of locomotives in gathering ceased long ago, as actual demonstration of the advantages of the new way gradually removed all basis for reasonable opposition.

Admitting the existence of possible exceptions, the statement is nevertheless warranted and easily defensible, that the mule is no longer a "necessary nuisance" in extensive or permanent service underground. Stabled in the mine he is a constant item of danger in various ways. Subject to indisposition and injury he is un-



LOW-VEIN TYPE OF GATHERING LOCOMOTIVE

certain in regularity and length of service. A voracious consumer of feed, and requiring regular care, his "upkeep expense" goes on through idle days or weeks just the same as in production time.

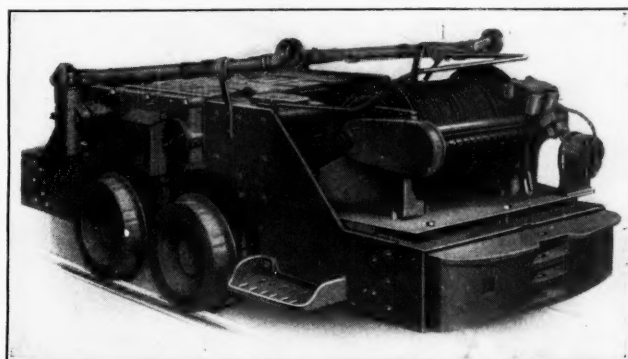
Animal haulage is not economical, either in first cost, operative expense, life of useful service or salvage return on disposal. Why, then, the mine mule?

For modern mines of large production, the gathering locomotive proposition bursts all bonds of relative economy considerations and takes rank as a physical necessity. None of the recent top-notch records in rapid development of new mines to large productive capacities could possibly have been made without organized mechanical systems of car handling from the face to the dump. For these operations there is no question as between mule and motor, but only as to what methods of locomotive gathering and haulage will be best, and what types of locomotives will be most suitable.

Gathering locomotives, generally speaking, are of small size and light weight as compared to locomotives for main haulage service. Hence they are admirably adapted in a most natural way to the development requirements of any mine, small or large, from its early days to its period of maximum tonnage and greatest haulage distances.

SOME MINES NEVER EMPLOY A MULE

One highly successful mine manager has illustrated his belief in early installation of locomotive haulage by saying that when he opens a mine and has room for a rail-length of track he puts in a pit car, and when he can double this length of track he puts in a small locomotive



GATHERING LOCOMOTIVE WITH TWO TROLLEY POLES

to haul the car, adding cars then until a second locomotive is called for by considerations of cars to handle, distances to run, divergence of entries, and advisability of having spare equipment to insure against possible interruption of the work. Certain it is that there are many mines in which no mule or horse has ever worked and where the haulage has been mechanical from the beginning.

The first locomotive—of gathering type, even though not at first equipped as a full-fledged gatherer—does all the haulage work. A second is added later to assist. A third and possibly others also divide the same work as the development progresses, all of them doing combination gathering and haulage work, or some of them serving only to gather, making up light trips which the others handle as haulage locomotives.

When later conditions call for the installation of a heavy locomotive for regular main haulage work, the lighter locomotives are all released for strictly gathering duty and the haulage becomes automatically a comprehensive system, which has grown in economical fashion with the needs of the work at costs consistent with the advancement of the development and output.

NEW AND OLD MINES

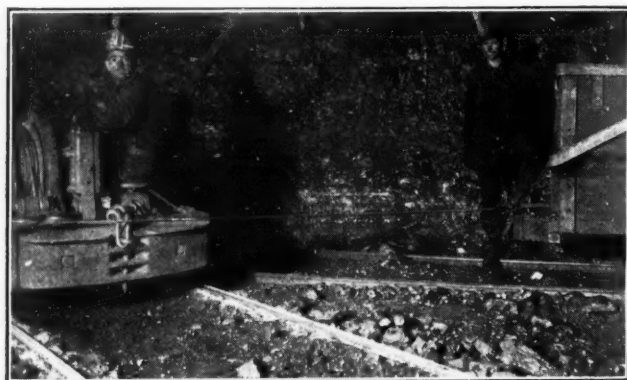
The new mine can readily be laid out and advanced with direct reference to the most effective operation of a complete system of mechanical haulage. Entry widths and spacing, room depths and necks, track character and curvatures, rail weights and bonding, switch locations and lengths, etc., are easily arranged to suit the plan of haulage which is to be used, and changes of the development plan can be made as experience or unforeseen conditions may dictate.

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Nor does the older mine often present serious difficulties in the economical installation and in the operation of a gathering system. Of course the older the mine and the more modest its past methods, the more care is called for in the selection of a suitable locomotive equipment for working to the extremities of the development. In all but mines of most indifferent management and lax methods, the change is entirely practical and by no means prohibitive in cost.

For electric locomotives, the entry tracks must be bonded, and trolley wire hung. If the locomotives are to work into the rooms, the use of wood rails should be discontinued and steel laid, though not necessarily bonded, as the fishplates furnish satisfactory bonds for the short distances represented by maximum room depths. If duplex cables are used on gathering reels, the room tracks are not depended upon for current return.

Tracks must be laid and maintained more carefully than for mule gathering, for only by having fairly secure



GOODMAN "UNIVERSAL" GATHERER PULLING LOADED CAR FROM ROOM

tracks can the advantage of the greater speed of the locomotive be realized dependably and with proper safety to men and equipment.

Room curves sometimes have to be changed, and rib corners cut away for proper clearance, though certain available types of strictly gathering locomotives in small sizes can usually be operated through the same clearances as the mine cars already in use. Minor alterations are necessary in various items of mine condition and operation, but all are in the direction of improvement and are well repaid independently of the advantages to be derived from the new gathering system itself.

However, where conditions are exceptionally bad, or local exhaustion not far ahead, or other aspects reasonably oppose the installation of the locomotives, such parts of the mine can best be continued on the old basis, while newer territory is changed to the better way, and all advancement work planned and operated similarly from the start.

So the operator with a new property has no monopoly of opportunity for enjoyment of the advantages and economies of locomotive gathering.

THREE METHODS OF GATHERING

Gathering methods are as variant in details as any other phase of mine operation, but in a general way they fall under three broad classes, applied singly or in combination.

1. *Entry Gathering*, wherein the miners push the empty cars from the entry to the face and return the loads to the room neck or onto the entry. The locomotive in this work usually operates on some plan whereby it distributes the empties of an in-trip to the room partings along one entry and goes at once to another entry to make up an out-trip of loads already pushed out by the miners. Local conditions or personal preferences determine whether the locomotive (a) pushes the trip of empties up to the head of the entry and drops them off at the rooms on the return, leaving itself a free way out to the main or side entry and to another room entry where the loads there waiting can be bumped ahead to make up a trip, which then is pulled to the main haul siding; or (b) pulls the empties in behind and drops them off at the rooms, crossing to the parallel entry to make up the load trip to push out to the siding.

The locomotive for this work may be of simple haulage type, in suitable weight, and requires no special features other than provisions for rapid handling and close control. If the miners leave the loads in the room necks and the locomotive has no electric conductor cable for enabling it to depart from the trolley wiring, it works with a car or two always ahead to reach the cars in the room necks without itself leaving the entry track.

Even for this plan of gathering it is well to have available the "gathering reel" of electric cable for enabling emergency operation into rooms or beyond the end of the trolley wiring on the entry.

WORKING INTO THE ROOMS

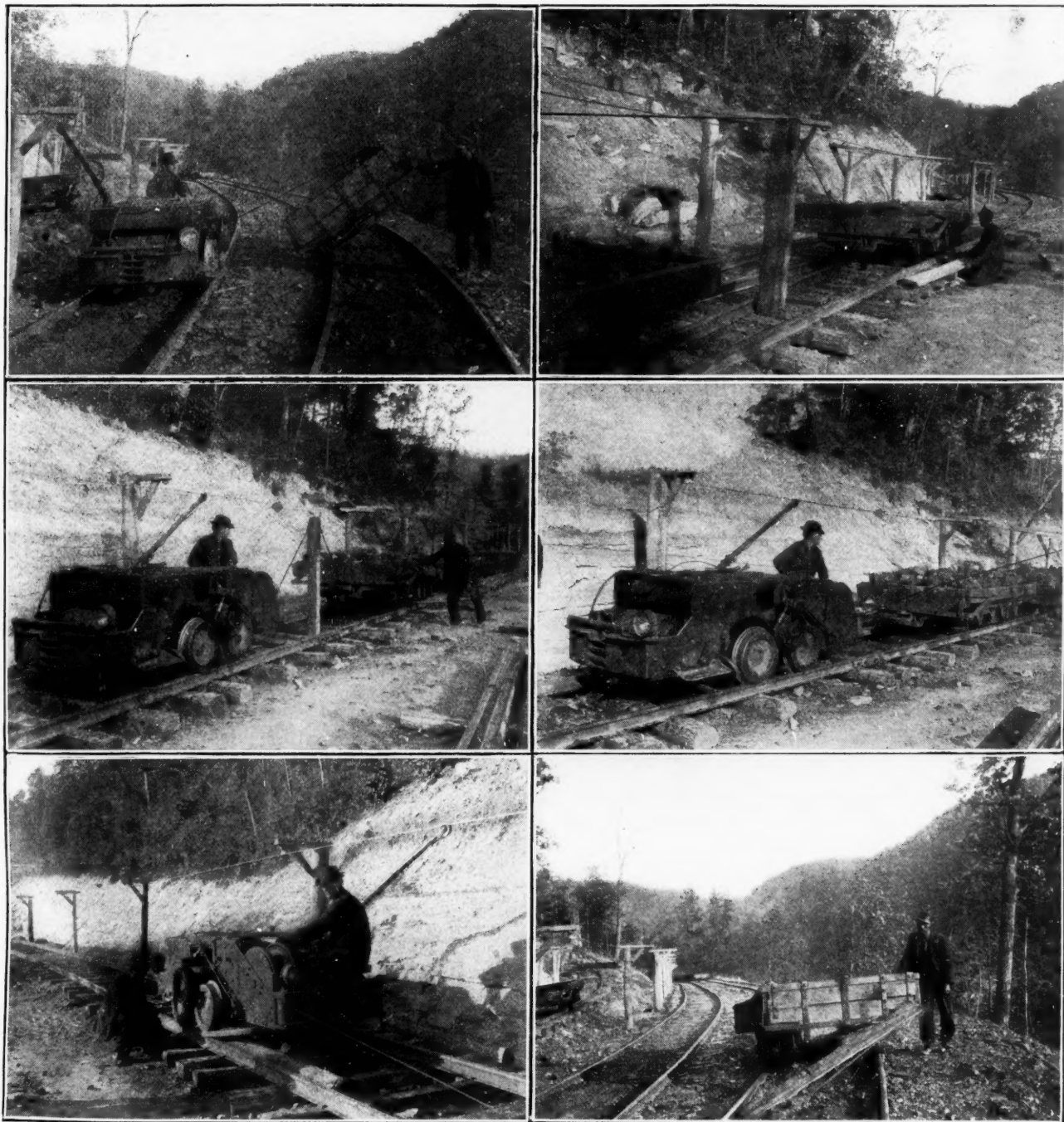
2. *Face Gathering*, wherein the locomotive regularly works into the rooms, hauling the loads from the face, and usually placing the empties in loading position for the miners. For this service the locomotive is equipped with a reel of electric cable, single or duplex, whose terminal or terminals are attached to the trolley wire, or trolley wire and track, on the entry to maintain the electrical connections for the locomotive as it works into the room. The cable is handled automatically by the reel, from which it pays off as the locomotive enters the room, and onto which it is wound again as the locomotive returns. A 500-ft. length of cable permits working full depth about three 300-ft. rooms, and proportionately more rooms of less depths, with one attachment of the terminals on the entry.

The trip rider or brakeman attaches the terminals of the cable, usually remains by them while the locomotive does all it can with that setting, and then moves them up to another setting and sees that the cable is properly reeled in when the work in that entry is completed. The reel is always on the "outward" end of the locomotive, opposite to the motorman, who therefore is in front as he enters the rooms and can readily couple on the loads.

Gathering on this plan usually starts at the head in the entry and the loads as successively brought out may be coupled up at once, the trip being then complete when the last car is brought out and coupled on, or they may be dropped at intervals along the entry as brought out and then bumped back to make up the trip as a whole after they are all "reeled out."

SINGLE- AND DOUBLE-ROOM TRACKS

In some mines the men push their empties to the face, the locomotives entering the rooms only to pull the loads. In others the miners are forbidden to move a car and



SHOWING SPECIAL USES TO WHICH THE CRAB REEL MAY BE PUT

From Top to Bottom, First Column: Overturning Car for Repairs; Rerailing First Car in Trip; Rerailing the Locomotive Itself. Second Column: Rerailing Last Car in Trip; Rerailing Any Car in Trip; Straightening a Car Slew'd Crosswise

the locomotives do all the work of placing and pulling. A still further refinement of room management is practiced in mines where intensive production is desired and physical conditions permit. Where rooms are cut wide enough to make the laying of double room tracks advisable or practicable as an assistance to rapid work in car loading, the rapidity of loading is further assisted by eliminating waits for cars on the part of the loaders. The gathering locomotive bringing in a trip of empties places them on, say, the left-hand tracks in the rooms, then at once or later pulls the loads from the right-hand tracks. Thus the miners always have cars and lose no time in idleness between the pulling of a load and the placing of another empty, as is unavoidable with single track. An approxi-

mation to double-track advantages is possible, however, where conditions permit, by pairing adjacent rooms and handling their cars alternately as on double tracks in single rooms.

USING THE CRAB REEL

3. *Face Gathering from Entry*, is designed for mines or local territories where for any reason it is impractical or undesirable to operate the locomotives into the rooms, as in pitching seams with rooms turned to rise or dip, or rooms in very low coal off entries brushed for good haulage height, or in old areas where tracks are too light or too poorly laid for reasonable safety of locomotive operation, etc. For this work the locomotive is equipped

with a "crab" reel, or power-driven drum and wire rope, with which it may reach long distances for cars to which it cannot go itself.

The locomotive remains on the entry and the trip rider goes into the room with the wire rope, whose end ring he couples to the car to be brought out. With a wag of his head he signals the motorman, who starts the drum drive and so draws the car to him. As it rounds the room curve he starts the locomotive also and, passing the latch, pulls the car out onto the entry track for coupling to the trip he is gathering.

For rooms to a steep rise the rope is operated through a snatch block anchored or secured to a jack at or near the face, thus serving to haul an empty in and lower a load out. For this work the length of rope must be at least twice the maximum room depth or other working distance.

FOR UNIVERSAL SERVICE

A locomotive equipped with both electric conductor cable and wire rope reels is fitted to perform any single gathering duty, or to operate in combinations of any or all the foregoing systems. Such a locomotive is of truly "universal" class and is so designated. It may do entry and switching duty, work into rooms, or reach with its wire rope. It may run to the length of its electric cable away from the trolley wiring and then reach on to the length of its wire rope for whatever it may be desirous of securing from such combined distances.

The crab reel is also of service in numerous miscellaneous and emergency ways, which alone are important enough to warrant the presence of the universal equipment on at least one locomotive at every mine.

The wire rope is useful in rerailing derailed cars, or even the locomotive itself. Broken cars may be overturned off the tracks at any point inside the mine or outside, or at the shop where repairs are to be made. Obstructing timbers or other heavy objects may be removed from the track or dragged wherever wanted. Rails, props or other material may be recovered from abandoned rooms or from under falls of roof. Methods of performing several of these "stunts" are shown in the accompanying figures.

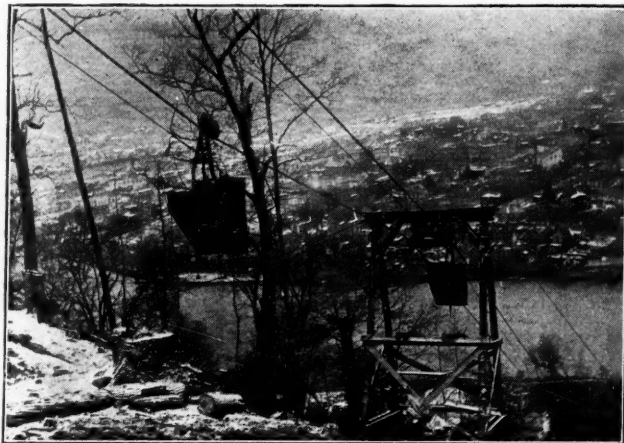
The gathering locomotive, in design and equipment, should be built as a gathering locomotive from start to finish—it must not be an adaptation of some regular main haulage type, with nothing to classify it as a gatherer but its light weight and the attachment of a reel of electric cable.

Utmost success in gathering by locomotives is dependent upon proper consideration of local conditions, proper decision as to the system of handling to be applied, proper selection of the right type of gathering locomotive, and proper operation of the equipment. Some mines fail to realize what they expect, and might readily secure, because they fail to realize first that the system and equipment cannot run themselves. Thorough organization of a comprehensive haulage system is essential to top-notch results, and of course the maintenance of tracks, wiring, cars and locomotives in good shape for reliable and continuous operation is equally necessary.

With these matters given due attention—as of course they should be under any circumstances and for any sort of equipment—the gathering locomotives, and the entire haulage for which they are the feeders, will render good account of themselves on the record sheets.

An Aerial Tramway for Handling Coal

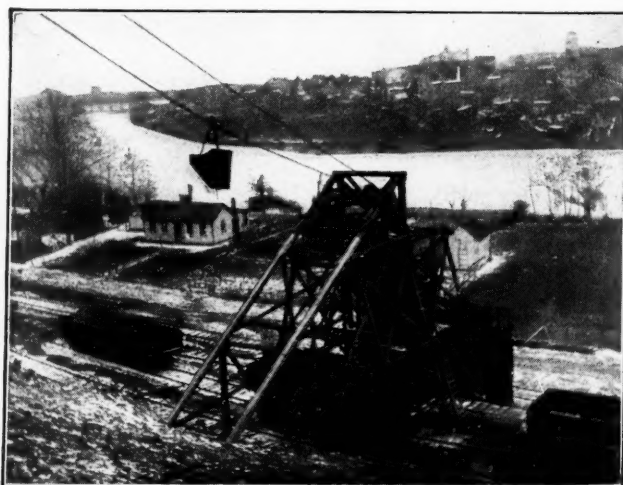
The accompanying illustrations show the loading and discharging stations of an aerial tramway installed by the Broderick & Bascom Rope Co., of St. Louis, Mo., at the mine of the Harlan Home Coal Co., at Harlan, Ky. This property is, however, now being leased and operated by the Republic Coal Co.



TRAMWAY SHOWING LOADED AND EMPTY BUCKET

The tramway is of the two-bucket or jig-back type. The length is 900 ft. with a fall of 430 ft. in this distance. The maximum capacity of the tramway is 45 to 50 tons per hour, each bucket carrying 2700 lb. of coal.

One attendant only is required for the operation of the tramway. This man is located at the loading station and controls the gate levers for filling the buckets as well as



THIS VIEW SHOWS THE DUMPING TERMINAL WHERE THE COAL IS LOADED INTO RAILROAD CARS. NO DUMPERS ARE NEEDED AT THIS DISCHARGE TERMINAL

the brakes regulating the speed of the line. At the discharge end, the buckets are tipped and dumped automatically.

The track cables on this equipment are $1\frac{3}{8}$ in. in diameter, while the traction rope is $\frac{5}{8}$ in. in diameter. The installation has been in operation for four months.

Coal Transportation in Eastern Kentucky Mines

BY MARTIN PREHN

SYNOPSIS—An attempt to show how conservation and organization can effect big operating savings through the judicious selection and use of equipment. Roller-bearing wheels enabled a saving of more than 1c. per ton.

One of the newest of the big coal developments in Kentucky is that of the Elkhorn Mining Corporation, with mines at Fleming, Haymond, Hemphill, Garrett and Wayland. The company's mines in this district—which takes its name from Elkhorn Creek—are served by the Baltimore & Ohio and Louisville & Nashville R.R. A rather exhaustive description of the manifold activities of the company appeared on p. 1041 of the June 27, 1914, issue of COAL AGE.

The Elkhorn district is new, and for that reason presented a wonderful opportunity for the development of an intensely modern and up-to-the-minute plant. Every possible contingency was looked upon as a sure-to-come occurrence; it can, therefore, be imagined how complete are the appointments, and in how many ways—physical and social—the property has been protected to safeguard income for all time.

It was sought to increase the efficiency of employees (and, directly, that of the equipment they handle) by caring for their welfare. To this end, unusually comfortable dwelling houses, of 6 and 8 rooms each, were erected; churches, schools, municipal buildings, stores, etc., were supplied. In short, the company built 5 actual towns—Fleming, Haymond, Hemphill, Garrett and Wayland—and provided them with comforts usually unsought in mining communities, simply to get "spirit" into its men and more efficient work out of them.

This insistence on practical efficiency went beyond the personal element in that its tests were applied rigidly to all parts of the mechanical plant before these were finally approved and standardized.

POWER PURCHASED FROM OUTSIDE COMPANY

Therefore, in order to prevent loss of interest and tying-up of capital, a private power plant was not built. Instead, current is purchased on contract from the Consolidation Coal Co., of Jenkins, Ky., whereby total power expense is said to have been much reduced. And where rates for electricity are reasonable, this method appears to be efficient and economical for various excellent reasons.

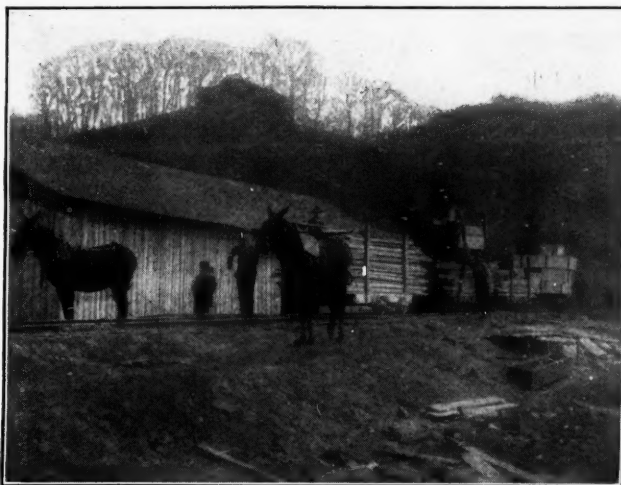
Of course, it is one of the elementary principles of economics that anything idle produces waste. That draws the line tightly and it is naturally impossible to keep everything going at capacity all the time; but electrical energy, when furnished by central stations, works very closely to that point. There is no outlay for prime movers or generating equipment (and the interest on such investments is saved); there are no standby losses, which must otherwise occur about every mine, however well regulated or organized it may be; only the power used is paid for; the voucher charge represents money that is be-

ing spent for a live purpose; and there are no power expenses when power is not being used in doing useful work.

But we are not arguing for the central station, nor for the isolated plant. The endeavor is simply to show how the Elkhorn Mining Corporation manages to mine coal cheaply, sell it cheaply and earn a good profit—the one combination of circumstances that does most to discourage inexperienced governmental interference.

Just as railroading is the biggest single industry next to agriculture in the nation at large, so in mining, transportation is the biggest single item, aside from the actual extraction of coal.

An examination of the Elkhorn Mining Corporation's transportation plant should, therefore, lead to interesting and instructive conclusions, especially because the prime



WHERE TWO MULES HAULED 28,000 LB. THE CARS HAD ROLLER-BEARING WHEELS

aim throughout centers about the ratio of investment to return—and none but the most favorable ratio possible is accepted.

Advantage was taken of every feature that would in any way aid in the reduction of costs, or the increase of efficiency. It was sought to reduce first cost and its constantly accruing interest for the entire transportation plant by adopting a liberal policy in the purchase of the details of the equipment.

This was done by making a careful survey of the situation in the usual manner and then arriving at the highest-profit-producing equipment by a process of elimination. Take locomotives, for instance. Naturally, the number and size of locomotives were determined, first, by the average 24-hr. tonnage; secondly, by the total resistance of cars at the most difficult part of the track; thirdly, by the average speed and the average number of daily train movements.

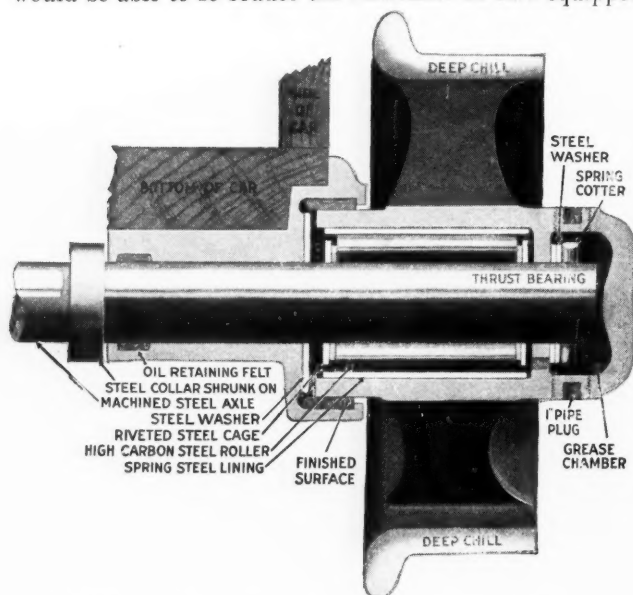
In such cases, figuring should be liberal, and allow a fair margin for overload, extensions to plant or unexpected increases in output. By this process a gage may be

secured on the first cost of locomotives (and cars). Such a careful plan will also give an approximate cost for curved and tangent rail, ties, switches, crossovers, targets and other track appurtenances, since the weights of these things are generally determined by the loaded-axle weights of the locomotives.

This is the crucial point at which a decision one way or the other determines for all time whether or not the transportation plant will be economical—a payer of good dividends—or wasteful, in the modernly accepted sense of the word.

DECIDING ON A TYPE OF WHEEL

The extensive experience of the deciding powers of the Elkhorn Corporation caused them to weigh carefully the question of car wheels. Many severe tests were conducted to ascertain, if possible, if any existing type of wheel would be able to so reduce the resistance of cars equipped



SHOWING DETAILS OF THE ENTERPRISE WHEEL

with it, that it would enable lighter rail, lighter locomotives and less electrical energy to handle the given tonnage in the given time. It is perfectly obvious that the discovery of such a wheel—even if its own first cost were very high—would be an extremely economical and profitable investment, since, by permitting the use of lighter apparatus, it would materially reduce the first cost of the system as a whole and make additional and continuous reductions in operating costs by reducing maintenance and current consumption.

The widespread use of roller-bearing wheels of various kinds suggested a possible solution. Certain types were found to be particularly well fitted for the condition in hand, and after further tests revealed decided operating savings of a most important nature.

It was found that a given locomotive could haul a train equipped with roller-bearing wheels over a given piece of track in half the time and with half the power consumed for a similar train equipped with plain-bearing wheels. Getting down to a dollar-and-cent basis this shows an average saving, for power alone, of one-third cent per ton of coal hauled, when the price of current is $1\frac{1}{2}$ ¢. per kw.-hr. To this must be added the savings for which certain features of the type of wheel that was finally chosen are wholly responsible.

The Elkhorn Mining Corporation finally chose as standard the Enterprise wheel, made by the Enterprise Foundry & Machine Works, of Bristol, Virginia-Tennessee. The wheel is of the same general design as all roller-bearing wheels made by this company and had the benefit of individual metallurgical treatment by Asa W. Whitney, the Enterprise works' car-wheel metallurgist.

THE OPERATION OF THE WHEELS PRODUCED MATERIAL SAVINGS

By enabling a locomotive to handle double tonnage, the same tonnage at twice the normal average speed; or normal tonnage at half the usual current consumption, virtually 50 per cent. of the normal locomotive equipment may be released for other service, or resold at second-hand value. It is also true that with proper wheels, lighter (and cheaper) locomotives may be purchased, followed by a lower investment right down the line. At any rate, the natural reduction in maintenance and operating expenses by far offsets any higher first cost of the wheels.

It was found, also, that to the savings already shown must be added a substantial reduction in labor charge, made up as follows: Release of 50 per cent. of trip crews, which amounts to doubling the tonnage per man, without affecting his original daily wage; the elimination of oil boys, resulting from the fact that lubrication no oftener than twice a year has proved ample. And another saving, not too insignificant to be overlooked, is the use of the lubricant itself, due to its enforced economical use.

A detailed analysis of the cost sheets would be burdensome; but a summary of the savings in lubrication, power, motor-crew expense and wear and tear on motor and other equipment was found to average from $1\frac{1}{4}$ to $1\frac{1}{2}$ ¢. per ton of coal mined.

And since this saving affects only one department—transportation—it will be realized how extensive it may become when the same scientific methods are applied throughout all the workings, as in the case of the Elkhorn Mining Corporation.

Graded Schools and Kindergarten at Mount Hope, W. Va.

Few towns in any community can boast of a better school system than that found in Mount Hope, a mining town in Fayette County, West Virginia. With a population of about 2500 this town has a handsome new high-school building, a large graded school and a kindergarten with a total enrollment of 750 pupils and an average attendance of over 600. Most of them are children of the workmen employed in the mines in that section. Taken altogether, it is about as healthy and comfortable-looking a bunch of youngsters as could be imagined. They are children of various nationalities, as their builds and countenances indicate. The mines at Mount Hope are operated by the Mount Hope Coal & Coke Co.

A Record Output

The Ebensburg Coal Co.'s No. 1 mine at Colver, Penn., broke all its previous daily records for production on Feb. 25, the output being 4524 net tons.

Notable Hoisting Installations

BY R. C. GREENFIELD

SYNOPSIS—A description of some radical departures in the design and operation of mine hoists. One of the plants is capable of handling 4000 tons of coal in 8 hr. from a depth of more than 400 feet.

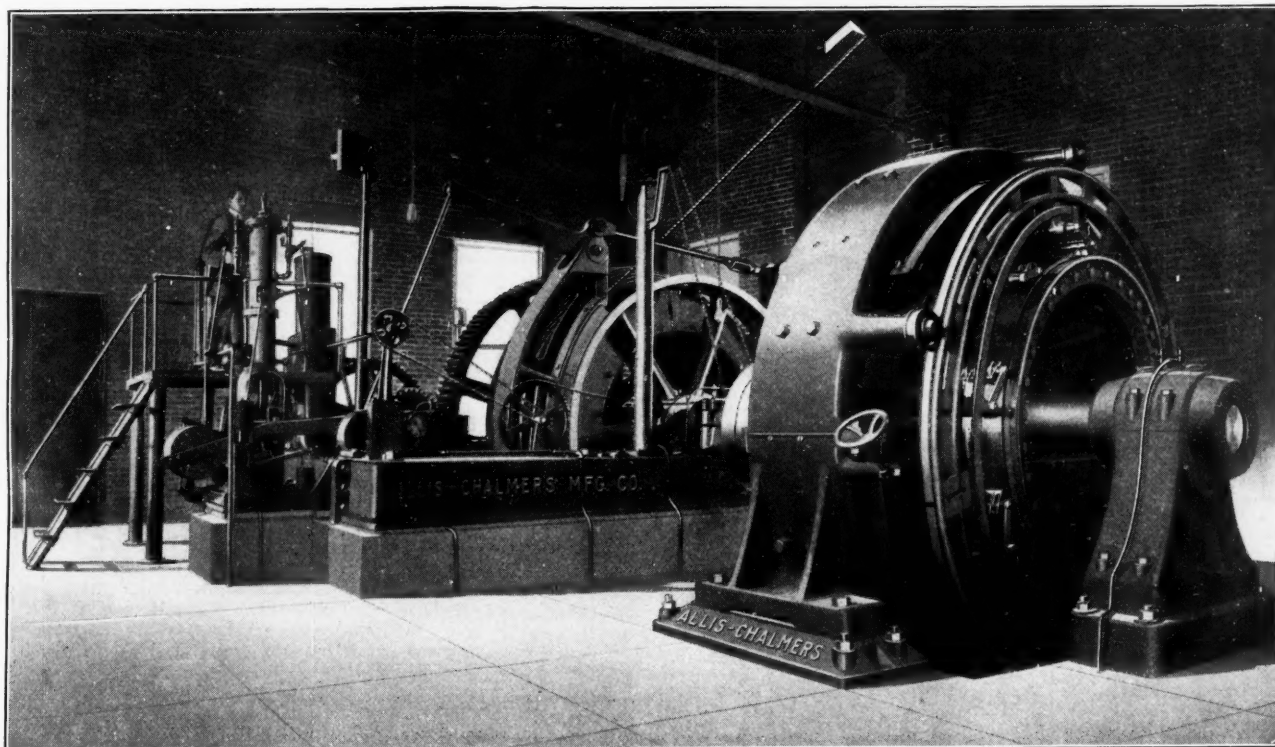
The subject "Electricity in its Relation to Mine Hoisting," has been reviewed each year with increasing interest, due to the wonderful advancements that have been made in the electrical field.

The interest displayed in the past year's review is only more marked than that of former years; because of the fact that the advancement in mine hoisting exceeded that of previous years.

at 550 kw. and an 8-ton steel flywheel. The set also has a direct-connected exciter rated at $22\frac{1}{2}$ kw. The hoist is designed to operate normally in balance. The maximum rope pull on one rope is 20,000 lb. and the maximum rope speed 1660 ft. per minute.

One of the many interesting features of this installation is the auxiliary alternating-current motor drive which was furnished for hoisting men and supplies.

This auxiliary motor drives the hoist through a set of double-reduction gearing, the main pinion of which is provided with a shifting mechanism which allows of its being thrown both in and out of mesh and locked in either position. When it is desired to handle light loads or men, the flywheel set can be shut down and the hoist operated by means of this auxiliary motor, thus obtaining greater



HOIST AND MOTOR INSTALLED IN PLANT OF ILLINOIS MIDLAND COAL COMPANY

Among the interesting and without doubt the most notable installations of the year are the two hoisting plants installed by the Illinois Midland Coal Co., at Kincaid, Illinois.

These plants are duplicate installations, and one of them will be found illustrated in the accompanying cut. Each plant is designed to handle 4000 tons of coal in 8 hr. from a depth of 410 ft. A short description of one of the plants will suffice for both.

The hoist motor is of the slow-speed type operating on continuous current at 500 volts and at 65 r.p.m. and is rated at 675 hp. It is controlled by the Ward-Leonard system.

The flywheel set consists of a wound rotor induction motor rated at 450 hp., a direct-current generator rated

economy in operation. When the auxiliary motor is not required the pinion is thrown out of mesh and the gearing stands idle. The complete equipment, including hoist, motor, motor-generator flywheel set, switchboards, and auxiliary apparatus was designed and furnished by the Allis-Chalmers Manufacturing Company.

ANOTHER INTERESTING INSTALLATION

No less interesting are the hoisting equipments furnished another mining company during the past year.

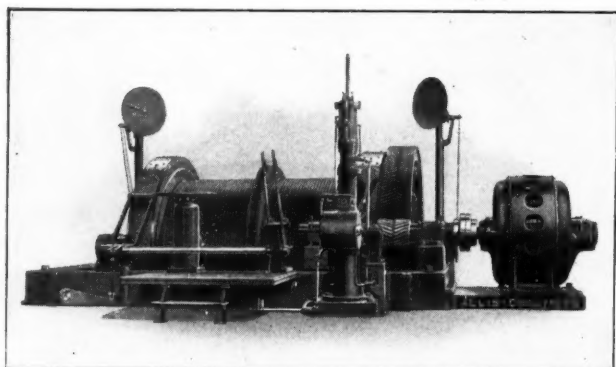
These consist of three Allis-Chalmers double-drum electric hoists, two of which were designed to have a maximum load of 16,880 lb. and a maximum speed of 680 ft. per minute; the third has a maximum load of 11,900 lb. and a maximum speed of 1000 ft. per minute. These

hoists are driven by 250-hp. and 300-hp. alternating-current motors, respectively.

Each installation consists, in addition to the hoist and motor, of an Allis-Chalmers liquid controller operated from the operator's platform, dial indicators provided with safety overwind switches and governor-operated slow-down devices. These latter work in conjunction with the brake engine and controller and operate to slow down and stop the hoist, should it exceed the speed limit, or attempt to overtravel and carry the cage into the sheaves.

The overwind switch operates in connection with the dial indicator and is so arranged that at a predetermined amount of overtravel the switch will open and cut off current from the hoist motor and from a solenoid-operated valve located on the brake engine, which automatically applies the brake at a speed regulated by the setting of the valve.

The slow-down device consists of a flywheel governor driven from the drum shaft by a chain in order to secure positive action, and of a solenoid-operated valve located in the controller tank operating in connection



DOUBLE-DRUM ELECTRIC HOIST BUILT FOR DAVIS COAL & COKE CO.

with the governor. In case the operator fails to slow down the hoist, when approaching the end of travel, the valve automatically operates and slows down the motor. The operation of this valve is dependent on the position of the cage and also on the speed of the governor.

THE HOISTING PLANT OF THE DAVIS COAL & COKE CO.

Another characteristic and noteworthy installation is the hoisting plant of the Davis Coal & Coke Co.

This installation consists of a double-drum electric hoist, a 300-hp., 550-volt, 60-cycle, 3-phase, 600-r.p.m., variable-speed motor and a magnetic-type controller operated from a master drum. The hoist is designed to operate normally in balance. The maximum rope pull is 16,900 lb., and the maximum rope speed is 1300 ft. per min. One of the drums is keyed to the shaft while the other is driven by a multi-tooth type jaw clutch made of cast steel. The drums are carried on a common shaft.

Each drum is served by a powerful brake of the band type. Dial indicators are provided as also overwind devices. The hoist is operated by a variable-speed motor through a single reduction of "Wuest" double-helical cut gears.

The complete plant, including hoist, motor, switchboard and auxiliary apparatus was also designed and built by the Allis-Chalmers Company.

Recent Legal Decisions

Duty to Insulate Electric Wires—A coal operator is liable for injury to a miner caused by his coming in contact with an uninsulated electric wire on stepping aside in a mine passage to permit a mule and car to pass. (Michigan Supreme Court; *Hazzard vs. Consolidated Coal Co.*; 149 Northwestern Reporter, 991.)

Carrier's Liability for Discrimination—Suit against a railway company under the laws of Ohio to recover damages for discrimination in furnishing switching facilities must be brought within six years after the cause of action accrues. (United States Circuit Court of Appeals, Sixth Circuit; *Hocking Valley R.R. Co. vs. New York Coal Co.*; 217 Federal Reporter 727.)

Phases of Coal Sales Contracts—Under a contract for a sale of fuel to be delivered in carload lots and paid for on receipt of each car, the mere fact that the seller returned a check for a shipment on the mistaken ground that it did not cover the agreed price did not constitute such breach as entitled the buyer to rescind the contract, the seller having later admitted the mistake. But the buyer's failure to pay for 15 cars delivered was a breach which entitled the seller to rescind as to further deliveries. (Michigan Supreme Court; *Stevens vs. Forrest*; 149 Northwestern Reporter, 982.)

Duty to Miners' Loaders—Loaders employed by miners who have a contract with a mine operator for the widening of an entry and removal of coal and slate at a stated price per ton for coal mined, are employees of the operator in the sense that he is under legal obligation to use an ordinary degree of care to provide such loaders with a reasonably safe place of work; they being paid by the operators, although their wages are deducted from the amount due the contracting miners. (Kentucky Court of Appeals, *Bon Jellico Coal Co. vs. Murphy*, 171 Southwestern Reporter 160.)

Responsibility for Death of Miner—A Colorado coal operator is liable for death of a coal miner, killed while on the slope of a mine when struck by a runaway car, if the accident is directly attributable to failure of the operator to provide places of refuge along the slope and proper safety devices at the head of the slope to avoid cars running away, and to negligent failure of another employee to properly couple the car to other cars before starting it down the slope. (Colorado Supreme Court; *Taylor vs. Parkdale Fuel Co.*; 144 Pacific Reporter, 1138.)

Authority of Officer of Corporation—Validity of Contract—One who is secretary, treasurer and general manager of a coal corporation has implied authority to bind it by a contract to buy coal within the scope of the company's business. When it appears that two parties have agreed through correspondence upon a contract of sale on certain terms, it will be deemed to be mutually binding, although one of them afterward refuses to sign a formal contract embodying the terms of the agreement. (United States Circuit Court of Appeals, Third Circuit; *New York & Philadelphia Coal Co. vs. Meyersdale Coal Co.*; 217 Federal Reporter 747.)

Damages in Condemnation of Land—In a suit by a coal company to recover for damages to land caused by condemnation of a strip by a railroad company to widen its right-of-way, it is held that the damages are to be measured by the depreciation in the market value of the whole tract caused by the taking. In determining the value of the land immediately before the condemnation, it is proper to consider the purposes for which the land was adapted, such as the operation of a coke plant in connection with an existing furnace plant. (Pennsylvania Supreme Court, *Marine Coal Co. vs. P. M. & Y. R. Co.*; 92 Atlantic Reporter, 688.)

Pennsylvania Statute Concerning Boreholes—Rule 18 of Article 25 of the Pennsylvania Bituminous Mining Act of June 9, 1911, reads: "In the cutting of clay veins, spars or faults, entries or other narrow workings, going into the solid coal, in mines wherein explosive gas is generated in dangerous quantities, a borehole shall be kept not less than 3 ft. in advance of the face of the work, or 3 ft. in advance of any shothole drilled for a blast to be fired in." Held, that enactment of this rule constituted a proper exercise of the legislature's power to provide for the safety of miners. Compliance with the requirement is necessary, although clay veins, spars or faults are not being cut, and are not known to exist in the place, and although there may be an honest difference of opinion as to the benefits to be derived from enforcement of the rule in a particular instance. (Court of Quarter Sessions, Fayette County; *Commonwealth vs. Halvert*; 42 Pennsylvania County Court Reports, 545.)

Reliable Inclined-Plane Equipment

In many portions of the coal fields of the United States, particularly western Pennsylvania, West Virginia and eastern Kentucky and Tennessee, the coal deposits lie in such a position that it is necessary to lower the output of the mine down a hill to the point of shipment. Under such conditions the force of gravity is often taken advantage of for the operation of the haulage equipment,

ditions. Such a machine must be abundantly strong to withstand exceptional stresses, and also have ample braking surface in order to control, check or stop each trip at any point on the plane with but slight exertion on the part of the operator.

The J. C. Stine Co. of Tyrone, Penn., which makes a specialty of coal-mining equipment, manufactures no less than 16 sizes of inclined-plane machines, all of which are similar in principle but differ in details of construction.

In this type of machine, which may be built either

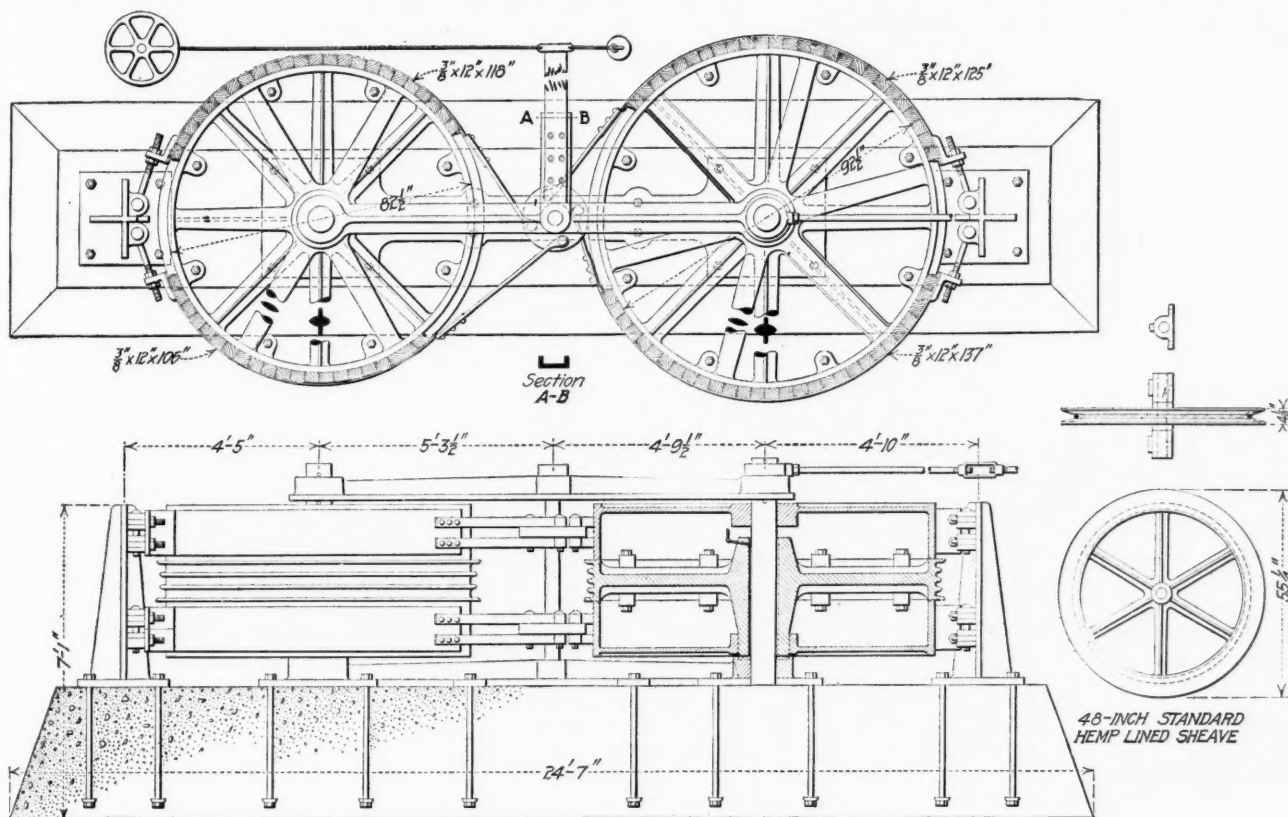


FIG. 1. A No. 16 SPECIAL INCLINED-PLANE MACHINE

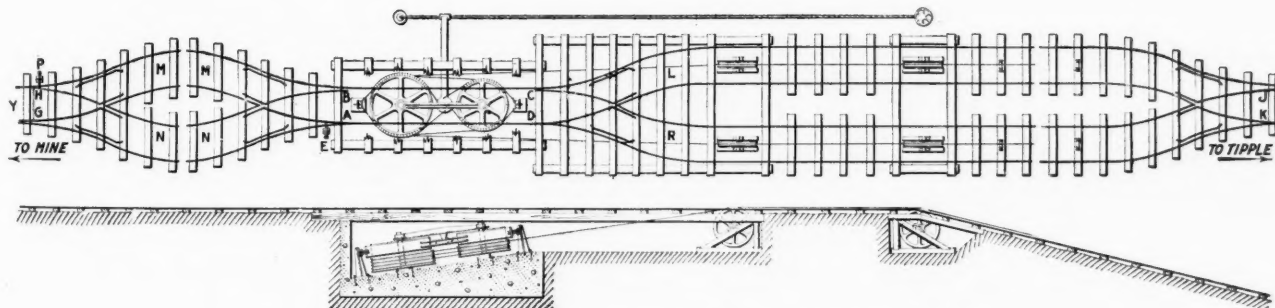


FIG. 2. PLAN AND SECTION OF A 4-RAIL INCLINED PLANE

and what is known as a self-acting inclined plane installed.

The installation of this type of haulage, while apparently extremely simple, requires considerable care in the selection of the most advantageous location for the inclined plane and a thorough study of the topography of the ground traversed. It is highly essential not only to secure the most advantageous loading and dumping facilities, but also to provide proper machinery for perfectly controlling the loads and empties under all con-

ditions. Such a machine must be abundantly strong to withstand exceptional stresses, and also have ample braking surface in order to control, check or stop each trip at any point on the plane with but slight exertion on the part of the operator.

As is well known the resistance of a rope to slipping on a pulley increases directly with the square of the number of turns, thus, two complete coils of the rope upon the sheaves have a grip equal to four times that of one coil. Three coils have a holding power equal to nine times that of one coil, and so on. The result of this is that with but a few turns of the rope around the two

pulleys an enormous holding power is secured, sufficient to carry any load which it may be desirable to handle upon the inclined plane.

In the machines manufactured by the above named company careful provision is made for braking. The brake wheel or wheels, as may be observed in the accompanying drawing, which shows a No. 16 special machine, are cast independent of the grooved wheel, thus relieving

to direct that this sum shall in any event be paid into the compensation fund."

Suggesting amendment of the law, the court adds:

"Fourth—Some provision should be made in the act whereby the employee signifies his acceptance of the provisions of the act by some affirmative act on his part. Silence on this subject should not be construed into acceptance.

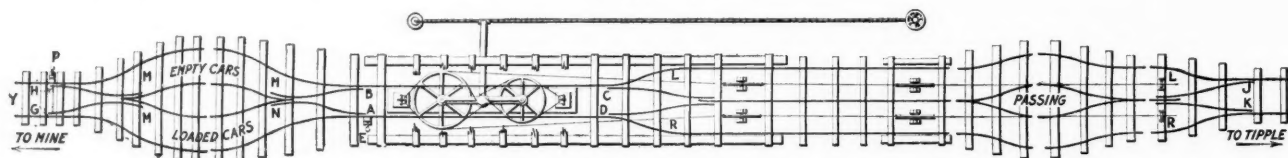


FIG. 3. PLAN OF A 3-RAIL INCLINED PLANE

the latter of the stresses incident to braking. The brake bands, which are lined with renewable maple blocks, are so arranged that all are operated at the same time by the manipulation of a single lever.

So far as the inclined plane itself is concerned one of the most difficult tasks confronting the person who contemplates the installation of one of these devices, is the track layout. The accompanying illustrations, Figs. 2 and 3, show two typical arrangements, one for a three-rail and the other for a four-rail incline. These layouts, however, are susceptible of many variations, as the inclined-plane machine may be placed either as shown below the track level or may be raised to the level of the ground between the tracks or placed to one side as the circumstances of the individual case show to be most desirable.

The Kentucky Compensation Act

BY A. L. H. STREET*

Several weeks ago I referred to a decision of the Court of Appeals of Kentucky holding certain features of the compensation act of that state to be unconstitutional. The decision seems to have created some general misapprehension as to the validity of the law, for the Court of Appeals has just handed down a supplemental opinion to make the original opinion more explicit. The court now makes it clear that the law is to be deemed invalid only so far as it purports to limit the amount which may be recovered for injury to an employee who has not expressly elected to come within the provisions of the law, and so far as the act provides for payment into the state compensation fund of any part of compensation due for death of a man who leaves no dependent relatives. The supplemental opinion reads, in part:

"First—The provisions of the present compensation act, as far as they affect the employer, are unobjectionable, as they do not conflict with any provisions of the Constitution.

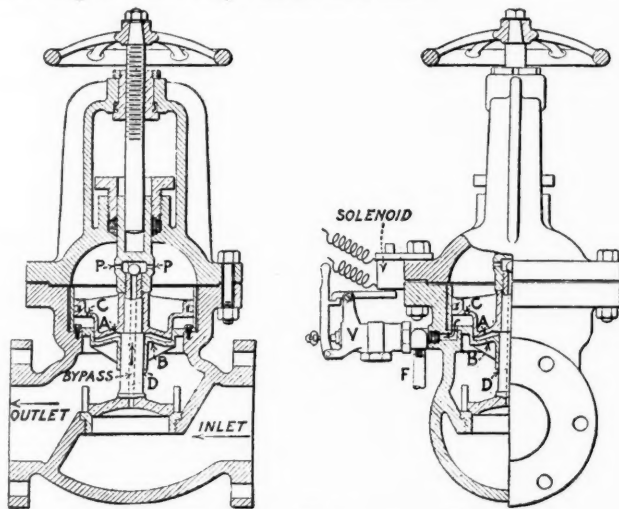
"Second—Any employee coming within the provisions of the act may voluntarily agree to accept its provisions fixing and limiting his recovery in case of injury.

"Third—He may likewise voluntarily accept the provisions of the act fixing the amount that shall be recovered in the event of his death, and said sum should be paid to his dependents, if he leaves any, and, if not, to his personal representative. The legislature has no power

"Fifth—Provision should be made in the act for appeal to a court of competent jurisdiction for review in all cases where compensation is denied, or where a less sum is allowed by the board than that claimed by the injured employee." (State Journal Co. vs. Workmen's Compensation Board, 172 Southwestern Reporter 674.)

A Remote-Control Valve

An examining board in conducting a license examination for stationary engineers once asked the question: "What steps would you take in case the governor belt on the engine broke?" To this one of the applicants replied: "Unless I was within reach of the throttle I would take the engine-room steps three at a time."



SECTIONAL VIEWS OF EMERGENCY TRIP VALVE

When the power plant is running smoothly and each machine is faithfully performing its allotted function a multiplicity of safety devices is a superfluity. But when machine parts fail and the entire plant is threatened with disaster or destruction the most effective means of averting trouble is none too good. The first and most important lesson which the careful horse trainer impresses upon the colt he is breaking is implicit and unfailing obedience to the command "Whoa." In like manner the power-plant designer takes careful cognizance of the fact that the occasion may arise when it will be necessary in order to save the plant or even human life to stop either the entire plant or various units thereof easily and instantly. Deprived of steam the engine operating under load quickly "dies."

*Attorney-at-law, St. Paul, Minn.

In order to facilitate the immediate stoppage of either the entire plant or any of its constituent units the Golden-Anderson Valve Specialty Co., of Pittsburgh, Penn., has devised a line of valves, one of which is shown in the accompanying illustration. This particular valve may be controlled in any one of four methods: (1) Automatically, that is closing upon rupture of the pipe or other steam passage between the valve and the engine; (2) electrically by means of the solenoid; (3) by hand through manipulation of a valve in the small branch steam pipe; (4) by hand through

the medium of the valve wheel in the ordinary manner.

This valve is intended as an emergency shut-off or engine stop valve and may be operated either by hand from the floor of the engine room or by push button or switch from the engineer's office or other points in the plant.

In an installation provided with this or similar devices which may be operated instantly from a remote point there is no necessity for "taking the engine-room steps three at a time" when a steam pipe bursts or an engine for any reason "runs away."

Safety Conditions for Wire Rope in Mine Hoists

BY J. BRADFORD RICHARDS*

SYNOPSIS—Interesting and valuable data relative to the care of hoisting ropes. All stresses that occur in daily operation are carefully cited and analyzed. Observations on the "factor of safety."

In any operation where men are to be hoisted from or lowered into a mine, the wire rope should be selected with the capacity for not only lifting the load, but doing so with a safe margin. This margin is called by mining engineers the "factor of safety." It varies from 4 to 8 times the load, and is rarely less than 5. By the load is meant the total weight lifted including the weight of the rope itself. Thus the ultimate or breaking strength of the rope is equal to the load multiplied by the factor of safety used.

There are two principal reasons why such margins of safety are justified. One is that, after having become worn out from use, or deteriorated by conditions, or both, the rope must still have a safe margin of reserve strength in order to prevent accident. The other reason is to provide against the mechanical losses from stresses due to bending over the drums and sheaves, starting and stopping, attaining speed, and the friction of the running gear.

STRESSES DUE TO BENDING AND FRICTION

Stresses due to bending vary according to the sizes of drums and sheaves. If standard sizes are used, they are about 10 per cent. of the ultimate strength of the rope. If sizes one half the standard are used, about 20 per cent., and so on in inverse proportion. By "standard sizes" are meant those sizes as advised by wire-rope manufacturers in their catalogs. Stresses due to friction should not exceed 2 per cent. of the load for fair conditions.

Stresses induced by starting, stopping and speeding up, vary according to depth of hoist and rate of service or tonnage hoisted, but should not exceed 12 per cent. of the load in short lifts, or 25 per cent. of the load in deep shafts. Thus, when the several losses, including those due to wear and deterioration, are accounted for, the factor of safety is found to be justified.

*Assistant engineer, Hazard Mfg. Co., Wilkes-Barre, Penn.

Corrosion, by acid or sulphurous waters and dampness of the mine, is a frequent cause of deterioration. For this reason, failure to apply liberally a good rope dressing is another cause of deterioration. As a necessary factor for improved service, the importance of a well saturated rope cannot be overestimated.

That portion of the rope where the lower end is attached to the cage is also subject to deterioration. As the slack is taken up at the beginning of hoisting and the rope is pulled taut, the swaying is converted into vibrations; and, as the cage is wound toward the head sheave, these vibrations are increased and crowded into the shortening space. The effect on the socketed end is obvious. Crystallization of the wires takes place at this point. Therefore, at regular intervals, a portion of the rope next to the socket should be cut off and the end resocketed.

Advantage should be taken of these times of resocketing, to cut lengths sufficient for samples for observation and examination. By unlaying the strands and wires the condition as to deterioration of core and internal abrasion of the wires can be ascertained. If desirable these samples can be tested for strength and other physical properties at a laboratory fitted for this purpose. The facts learned in this way are a necessary adjunct to the daily inspection, as it is impossible for the eye to see the inside of the rope.

DAILY INSPECTIONS ARE ADVISABLE

While keeping informed thus at these regular intervals as to the internal condition of the rope, it is desirable to be able to judge of the progress of wearing generally, by superficial observation at the daily inspections. Frictional wear and corrosion externally, abrasion of the wires and deterioration of the core internally, due to use and conditions, are taking place. When the wires are worn down, thereby reducing the cross-section and lessening the strength of the rope, broken wires begin to appear along its surface. As wearing continues, the number of breaks increases. The significance of this increase is the evident sign of diminishing strength, because the broken wires are the result of the weakened condition.

As long as the breaks are far apart, the frictional tenacity of the rope does not relax, so that its strength

is not impaired in proportion to the number of breaks. But when several are observed near one point, as within one rope lay, the strength is much more affected. Thus, it is, that the number and location of the broken wires become largely an index of the safe condition of the rope. In other words, a certain number of broken wires in one rope lay, together with a certain loss by frictional wear as found by gage, is an indication of a definite lowering of the factor of safety; and finally, a point will be reached when this percentage of loss coincides with that point fixed as the limit of safety of the rope.

The following table is appended to show the several stresses in the case of a 1200-ft. hoist. Wire rope used, 1½-in. cast steel, standard construction. Time for a single hoist, 45 sec. Maximum speed 2000 ft. per min. Weight per foot of rope, 3.55 lb. Weight of 1200 ft., 2.13 tons. Weight of cage and material to be hoisted, 9 tons. Size of drum and head sheave, 12 ft.

TABLE SHOWING STRESSES IN A HOISTING ROPE

Stresses Due to	In Tons	In per Cent. of Ultimate
Load (including weight of rope).....	11.13	17.5
Friction (2 per cent. of load).....	0.22	0.3
Starting, stopping and speeding up (about 12 per cent. of load).....	1.34	2.2
Bending (about 5 per cent. of ultimate for 12-ft. sheave).....	3.17	5.0
Total working stress.....	15.86	25.0
Net safe margin.....	47.58	75.0

Ultimate strength 63.44 100.0
Factor of safety = Ultimate strength ÷ Load = 5.74 when new.

Net factor of safety = Ultimate strength ÷ Total working stress = 4 when new.

After a further loss of 25 per cent. from use, the ultimate strength would be reduced to 47.58 tons. The factor of safety would then be $47.58 \div 11.13 = 4.3$ and the net factor of safety would be $47.58 \div 15.86 = 3$, if there had been no change in the other stresses. But while the rope has worn down it has stretched, causing the stress due to bending to increase. The result is that after a loss of 25 per cent. from use, the net factor of safety would be less than 3.

For safe conditions, an original factor of safety of 4 as a minimum and preferably 5 should be used. And when from loss of section through frictional wear, or deterioration through all other conditions, or both, the rope shows a total loss of 25 per cent. of its original strength, the danger point has been reached.

This subject is now being carefully investigated by the U. S. Bureau of Mines, and a report with recommendations will doubtless be made in due course on its findings.

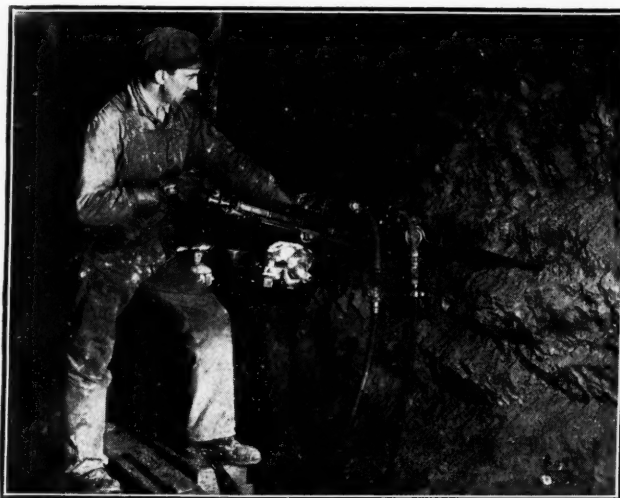
Mounted Jackhammers

Jackhammer drills have been extensively employed in coal mines for many purposes, including taking down top rock, breaking down coal, driving gangways and in general development work. The success attained in this field has been due to certain unique features which the machine possesses, such as its high speed of operation, its ability to penetrate any material, from the softest coal to the hardest rock without changing steels, the ease with which the tool is operated due to its automatic features and comparatively light weight and its general ruggedness and simplicity of design.

While the standard unmounted jackhammer is suitable for most of the operations of mining coal, occasions may arise where the drilling of horizontal holes has to be carried on and under such circumstances the effort of holding the drill to the work is apt to tire the workman.

Realizing the need for a mounting that would not be cumbersome, but at the same time would be heavy enough to withstand rough usage, the Ingersoll-Rand Co., 11 Broadway, New York, developed, after considerable experimentation, the mounting shown in the accompanying illustrations which is known as the "JM-6" type.

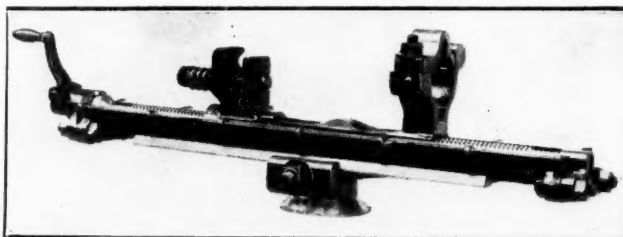
It is but an instant's work to clamp the standard jackhammer in the carriage of the mounting. Therefore, a



A MOUNTED JACKHAMER IN USE

single drill may be used conveniently for the twofold purpose of drilling horizontal and vertical holes without serious loss of time in making changes. Whether used as a mounted or as a hand drill, the jackhammer retains all the advantages due to its rapid drilling speed, the self-rotating feature and the efficient means for keeping the borehole clean.

A water-feed device of the Leyner type has recently been developed for use with the jackhammer whenever trouble from dust arises. The "JM-6" mounting is adapted for use with both plain and water-feed types of these drills. The clamp which grips the handle of the drill is provided with a cushion spring to take up the shock when a steel is being pulled out of a hole. The



THE DRILL MOUNTING

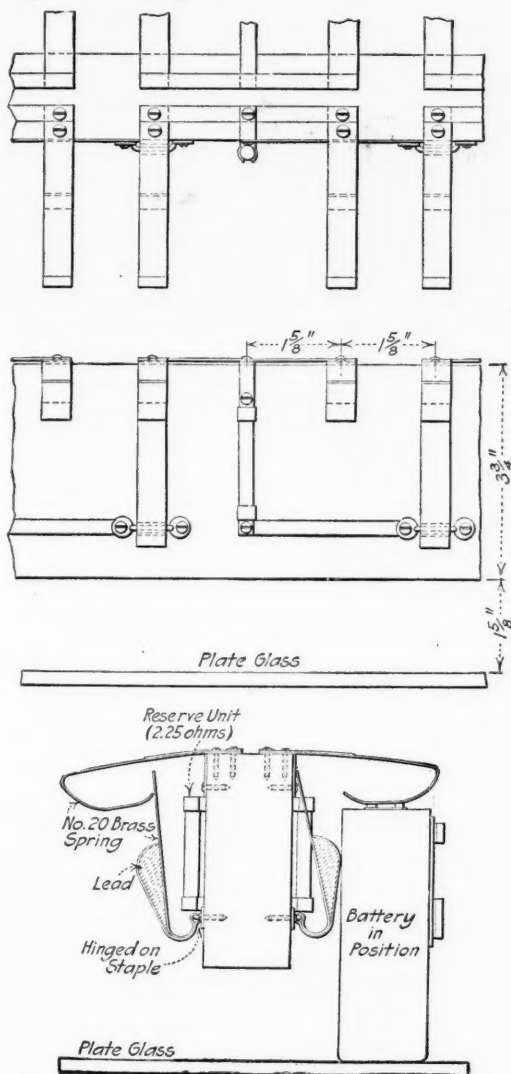
forward clamp on the carriage does not grip the machine firmly, but serves only as a support and guide.

The mounting is adapted for use either on the arm of a vertical column or a horizontal shaft bar, while the cone upon which the shell rests will fit into any 5-in. Sergeant saddle or clamp. The sliding cone gives a quick adjustment when setting up and can be used to increase the length of feed whenever necessary. The length of the feed-screw is a full 24 in. Adding to this the slide of the cone on the shell, which is over 19 in., it will be seen that the total travel is in excess of 43 in.

and may be obtained whenever desired. The total weight of the mounting is 63 lb. Steel castings and drop forgings are employed throughout in its construction, insuring ability to withstand hard usage.

Pottsville Charging Rack for Miner's Electric-Lamp Batteries

Where the miner's electric lamp is being used in large quantities, charging racks are provided with contacts arranged to facilitate the insertion of the storage batteries each day for charging.



DETAILS OF POTTSVILLE CHARGING RACK

Considerable annoyance and delay have been experienced with the designs now in use, and, with the view of overcoming all objections to this part of the equipment, the Philadelphia & Reading Coal & Iron Co., the pioneers of the electric cap lamp, recently brought out the equipment shown in the accompanying sketch and known as the "Pottsville charging rack."

It consists essentially of two brass springs connected to the positive and negative charging circuit which makes the contacts with the positive and negative terminals on the battery. There is also a pivoted weighted brass spring which makes contact with the positive charging spring

when the battery is removed, and a resistance unit connected between the weighted spring and the negative charging spring. The charging springs are reinforced with a pressure spring and are so designed that little travel is made when a battery is inserted, thus insuring a flat strong contact on the battery terminals and preventing the contacts from bending out of position.

When the battery is placed on the charging rack, contact is first made for an instant with the battery terminals and the two charging springs before the weighted spring is reached. This position does not short-circuit the battery as the charging current is flowing through the resistance and the voltage drop across the resistance will balance the battery voltage, hence no current flows. If the charging circuit is off when a battery is put on the rack, the battery will for the instant discharge through the resistance at only its normal discharge rate, hence it is impossible to short-circuit the battery.

As the battery is pushed forward under the charging springs, it moves the weighted pivoted spring forward, breaking its contact with the positive charging spring and diverting the charging current through the battery instead of the resistance which is now cut out. When the battery is taken out of the charging contacts, the above process is reversed and the charging current is reestablished through the resistance, thus leaving the main charging current value undisturbed without sparking at any contacts.

As the voltage drop across the resistance is practically the same as the battery voltage, any number of batteries may be put on or taken off the charging rack without any adjustment of the charging current value. Since the pivoted-contact device operates by weight, it is always positive in its action and needs no attention for adjustment; the movement of the charging spring at the point of contact produces a wiping action which keeps the contacts clean.

Anthracite Notes

A little known phase of the anthracite mining industry is the use of expensive barometers at the principal collieries of all the big companies, especially where the mines are gaseous. When the atmospheric pressure is decreasing, gas is released more easily, and the firebosses all look at the barometers before going into the mines to make their morning inspections. When the barometer is going down they look and test with extra care for gas.

Following the example of the large coal operators, a movement is on foot among several of the so called independent operators in Scranton to train first-aid teams with the coöperation of the Y. M. C. A. Last year teams from the Bull's Head Coal Co., Green Ridge Coal Co., Clearview Coal Co., Carney & Brown, and Nay Aug Coal Co. were given twelve weeks' training, but held no contest. This year State Mine Inspector S. J. Phillips, who is fostering the movement, hopes to induce the Peoples' Coal Co. and the Spencer Coal Co. also to join, and there may be an inter-company contest for a cup offered by the Y. M. C. A. and a banquet. The medical director is to be Dr. Harry Smith, and the expenses will be borne by the companies. Forty-two boy scouts from 12 to 16 years old are now being trained in first-aid-to-the-injured practice at the Scranton Y. M. C. A.

Explosion at the Layland Mine

A severe explosion occurred at 8:25 a.m. on Mar. 2 at the Layland, or No. 3 mine, at Layland, W. Va., a town lying at the head of the Quinnimont branch of the Chesapeake & Ohio Ry. in Fayette County, near the eastern edge of the New River coal field. The mine is owned by the New River & Pocahontas Consolidated Coal Co., an affiliation of the Berwind-White Coal Mining Co. It is working the Fire Creek bed.

It is early yet to state how many lives were lost. Reports show that 10 men were saved and probably 174 were killed. Of these, the bodies of 17 have been recovered. The force of the explosion was so violent that the stone arch over the main portal of the mine was destroyed, windows were broken within a radius of 300 yd., and the explosion was felt for miles around. A. B. Cooper, who was delivering groceries to a house about 75 yd. distant from the mine, was blown against a telegraph pole and killed.

The work of rescue is being aided by rescue car No. 8 of the U. S. Bureau of Mines, which, when the explosion occurred, was located at Glen Alum, Mingo County, W. Va., a village which, from a railroad point of view, is quite remote from the scene of the accident. The rescue force did not arrive till night, but the work of recovering the bodies and the few living men had been actively prosecuted all day by local miners.

Operators Disagree on Co-operative Plan

By H. S. MIKESELL

It seems that notwithstanding the persistent efforts put forth by H. C. Adams, of the Jones & Adams Co., for a return to the 1¼-in. lump screen basis by all the operators of the Western bituminous territory, which has been considered by many a matter of vital importance to the soft coal production of the country, the coöperative plan suggested will not become operative. This is mainly for the reason that the eastern Kentucky and Franklin County, Ill., operators will not join in the movement.

These two interests with heavy production are probably at the present time the strongest competitors for Western tonnage and market six or seven different sizes of coal. With their refusal to enter into the suggested arrangement is seems inopportune for the operators of other districts in the five states to standardize their lump production on a 1¼-in. basis.

The eastern Kentucky and Franklin County operators claim that there are many advantages to them in the preparation of the different sizes they are now making, and while Indiana, Ohio and West Virginia operators apparently strongly favor standardization, the undertaking now fails because of the disinclination of these two districts to coöperate with the rest. It is quite obvious to the operators in favor of this plan that its adoption would result in the production of less coal in excess of demand, and it was welcomed by a majority of the retail coal dealers, although some of the railroads were opposed to it because it meant extra expense in sizing the coal in engine chutes, and especially where the railroads were burning egg or smaller sizes and had not been accustomed to use lump.

It is regrettable that here is another case where the

producers cannot all agree on a coöperative plan of merit when it is evident to every soft-coal operator that the present method of preparation is most unsatisfactory and unprofitable. The screening of 4-in., 6-in. and even 8-in. lump coal in sufficient quantities to take care of the fall and winter demand for these sizes has always resulted in the production of numerous grades of small coal for which there is no regular demand. These small sizes accumulate every season, and have to be sacrificed at almost any price to relieve the car situation. The effect has always been to demoralize the market. The only alternative seems to be compulsory legislation to prevent this economic waste.

Gain in Production of Somerset County, Penn.

The production of the twentieth bituminous district of Pennsylvania comprising all Somerset County south of Holsopple increased in 1914. The inspector, F. W. Cunningham, says that he believes that no other district in Pennsylvania will show a gain.

The low percentage of volatile matter in the coal of Somerset County renders it of high heating quality and smokeless. Consequently it is highly desirable for naval, marine and industrial uses while unsuited for coking in ordinary beehive ovens. The inactivity in the steel business has therefore not affected it while the demand for a coal, not only pure but also efficient and for one free from smoke has given Somerset a lead over many of its competitors. Coal is no longer bought because it has a pretty look.

We give the outputs for 1913 and 1914 of the seven leading companies. The production of only one of these declined last year.

STATISTICS OF BITUMINOUS DISTRICT NO. 20 OF PENNSYLVANIA

Mines (87 in operation).....	108
Tons of coal shipped to market.....	6,713,727
Tons used at mines for steam and heat.....	166,122
Tons sold to local trade and used by employees.....	26,263
Total tons of coal produced (gain 262,647).....	6,906,113
Coke ovens (all idle).....	225
Tons of coal produced by pick mining.....	4,965,793
Tons produced by compressed-air machines.....	298,661
Tons produced by electrical machines.....	1,641,659
Persons employed inside of mines (gain 1126).....	7,365
Persons employed outside (gain 240).....	950

PRODUCTION OF COAL—SHORT TONS

	1913	1914
Consolidation Coal Co.....	1,952,760	1,990,638
Jenner-Quemahoning Coal Co.....	918,259	932,035
Quemahoning Coal Co.....	631,480	669,193
Brothersvalley Coal Co.....	488,083	550,481
Somerset Smokeless Coal Co.....	483,327	505,767
Knickerbocker Smokeless Coal Co.....	241,905	311,128
Baker-Whiteley Coal Co.....	201,627	200,265

Don'ts for First-Aid Men

Don't stimulate with alcohol; aromatic spirits of ammonia is preferred. Procure hot coffee as soon as possible.

Don't tear clothing from a person burned; cut it off.

Don't expose to the air large burned surfaces; dress them quickly.

Don't think that in the great Safety-First movement you are working for the special interest of your employer. You are not; you are working for yourself and your fellowmen.

Don't attempt to give stimulants to an unconscious person. The fluid may run into his lungs instead of his stomach.

Editorials

Private Privilege

History has been full of the contests between the people at large and private privilege. Whenever the latter appears, there are always many fulminations against it as if it were new, and not an old offender rearing its ugly head once more.

So we must not get unduly angry when the miner at the face tries to do what men who pride themselves on better mental equipment and even, in their folly, on better moral status have repeatedly tried to do in the past. Nevertheless, though the miner is by no means the first or only offender, the public must be firm. The miner must not be allowed to restrict the foremanship and inspectorship to the particular class of men that have mined coal at the face as he purposes to do with the help of the electorate in Senate Bill 160, now in the Pennsylvania legislature.

When we look over the list of inspectors and foremen we are disposed to say that practice has almost excluded all men but miners from the positions in question. There has always been a disposition to qualify and select such men. Law or no law, they have been usually so chosen. There is no deep-seated conspiracy against the man of the pick and the drill. Perhaps this is as it should be, but nevertheless the passage of a restrictive law is not to be commended.

The miner should always be careful lest he stir up retaliatory measures. Why not pass legislation forbidding miners to enter the legislature unless they have served a period as page-boys or scribes, or preventing them from being operators unless they have spent a period at billing coal? We may as well be logical in making our requirements.

It must be remembered that there are many things nearly as important to the safety of the miner as safe coal-getting. There are gas inspection and removal, the province of the fireboss; safe timbering, the work of the timberman; safe ventilation, the part of the brattice-man; the avoidance of breaking into accumulations of water and gas, the function of the surveyor; the maintenance of safety appliances, the duty of the mechanical engineer; and the general coördination of these and many other duties, the daily occupation of the supervisory force.

And it is fair to ask, Is mining the only wisdom-giving function around a coal mine? Moreover, should the miner be the sole care of legislature and union, or is a man to be chosen or rejected for his abilities alone and not according to certain arbitrary tests which a majority ordains?

Apparently the miners have used their numerical superiority in the union to back their demands against those of other union men. Let them remember that if the right to hold office depends on voting strength, then the hewer of coal is not entitled to any place in the gift of the people. The farmer would by that right carry away all the honors, and the miner would be compelled to spend

his labor at the pleasure of the man who followed the plow.

Just as the farmer is not justified in tyrannizing over the public, so is the miner without excuse in forcing his numerical superiority on the other mine employees and in saying, "You shall not seek preferment, because you belong to only a small category of workers."

"Business as Usual" but under Difficulties

The American operator's little tale of woe has worn him till he is weary with its iteration, and we will not refer to it now. We will rather lift the curtain today on the conditions under which the British coal trade is doing "business as usual" but under difficulties. The British coal master tries hard, like a good business man, to assure the world that business is unaffected by the war, but we feel he must agree with the American coal-mine operator and confess that the times are grievously out of joint.

To begin with, the shipment of coal, coke and patent fuel for January was only 60 per cent. of that of a year ago when there was no war. The foreign bunker trade of the British has been equally reduced in percentage. But, it must be remembered, that this does not include coal sold to the admiralty. So perhaps the fall of 2,300,000 tons per month in exports and 360,000 tons in foreign bunker trade is made good by these governmental purchases.

But it is those who are not supplying the navy who will suffer most in the coke and patent-fuel decline, and the west Yorkshire producers who mine fuel of the coking and patent-fuel type doubtless have suffered severely. The fact that South Wales is busy supplying the fleet hardly makes amends to the Yorkshire man for the decline in his own market.

The coal operators in west Yorkshire have had to face, in common with other operators, a decrease in the receipt of props of 30 per cent. and an increase in their price of about 45 per cent. And concurrently they have to meet a threatened strike of the coal miners who thought the great world war would give them an unequaled opportunity to increase their minimum wage. The operators gave way "with the object of avoiding the disastrous consequences of a coal strike in a national crisis" and conceded the contentions of the workmen's representatives as they specifically stated in their reply "during the continuance of the war between this country and Germany."

Increasing wages when work is not steady is a trying task, for the fixed charges, the pumping, the maintenance of the workings, and the banking of fires all bear heavily on the operator. The price of exported coal has gone up 3 per cent., or 10c. per ton, since the war started, but the west Yorkshire operator will have to look for a further rise if, during the war, he is to participate in "dividends as usual."

The Storage-Battery Locomotive

The evidence is constantly accumulating that the storage-battery locomotive has come to stay and perhaps even to oust its rivals. It is of course not absolutely safe in the presence of gas, but as the sparks it makes are not near the roof, the danger is lessened, for the gas must be in large quantity if it is to settle so low as to be ignited.

Another increase of safety with the battery locomotive results from its shortened electric circuit. The current does not pass from the power house to the motor and back through the rails to the generator, but the circuit is contained within the locomotive—not even the wheels are included in its range.

Thus if it is true that there is a risk of stray currents prematurely igniting shots, the current of the storage-battery locomotive can meet the accusation with a perfect alibi. And, of course, as there is no conducting wire, there can be no short circuits to ignite gas, coal dust or wooden structures.

The travel of the electric current along the drawbars and couplings of a train of mine cars has always been a strong objection to the trolley locomotive, as it has occasionally shocked men and ignited powder. For this reason operators have sought to improve the grounding of the traction rigging and to make powder cars relatively nonconducting throughout. In other cases the powder car has been hauled around by a mule.

The battery locomotive, however, having its current self-contained, does not offer any such risk. It seems that it would serve admirably for hauling men and transporting material, explosive and otherwise, into and out of the mines. By switching off the electric current on the main haulage road, the loading of men on the man trip and their passage along the road at the beginning and end of the day would be robbed of its dangers, some of which, though unnecessary, are unavoidable so long as careless and ignorant men are employed.

True, the use of a section insulator at the point of embarkation or disembarking has been occasionally adopted and has probably saved many lives, but the adoption of the battery locomotive for haulage is even more a safeguard against such accidents and removes, as has been said, the further danger of the ignition of powder.

In view of the fact that the storage-battery locomotive is not absolutely safe, but only safer than other forms of electrical haulage, it will probably not be adopted for that cause alone. But it has many other advantages.

In mines where all or part of the night load is quite light, it is customary to delay pumping till the mines are closed down. In the Middle West not much water has to be pumped. In other mines the water often runs out by gravity. Consequently, if undercutting is done at night and the coal is loaded and hauled out by day, there is a third shift during which the storage-battery locomotives can be charged. This tends to keep the load curve even and to save in expense. Additional boosting of the locomotive batteries can be performed during the lunch hours and when shifts are being changed, should the batteries need it and should the men walk to their work.

It has been generally thought that the storage-battery repairs would be excessive, but it must be remembered that there are no trolley harps, wheels and supports to

be maintained in condition. The chance of the armature bearings and poles heating or rubbing is about the same in both battery and trolley locomotives. The battery renewals *might*, however, cost so much that the cost of harps, wheels and supports would appear only a trifling drawback to electric locomotives.

This does not seem to be proved in practice, where the batteries are of the right kind. At Kellogg, Idaho, three types of locomotives were used. Because the conditions under which the statistics were collected are manifestly unfair to one locomotive, because the work it was required to perform was unduly light, because it was only credited with useful work and not with the waste rock it hauled, and because its time of service has been short, we will omit all reference to it. One $2\frac{1}{2}$ -ton locomotive operated with a combined repair and upkeep cost of \$0.00359 per ton. Roughly this is three tons to the cent. The running of a 4-ton locomotive cost \$0.00434 per ton of mineral hauled.

These figures, which are evidently of reasonable magnitude and not warranted to cause objection from those who think of purchasing storage-battery locomotives, are nevertheless loaded with costs which do not rightly belong to them. They include the cost of alterations and partial rebuilding at the time when the battery locomotive was installed. The locomotives had to be adapted to the charging system, and provision had to be made to protect them from the water issuing from the chutes under which they had to pass.

As the first locomotive had run only 20 months and the second only 17, this first cost had much to do with the repair and maintenance charges. G. W. Gwinn, who read a paper on these locomotives at the recent meeting of the American Institute of Mining Engineers, stated that the company's engineers believe that the upkeep and repair charges will be 75 per cent. less than for trolley locomotives doing the same work. This is based on an actual experience with excellent makes of trolley locomotives and gives no consideration to the expense of maintaining trolley wires and track bonding, which kept two men busy practically all the time on the somewhat longer stretches of trolley haulage.

The House Mines Subcommittee has made its report on the conditions in Colorado. It states that "Mr. Rockefeller has done much for the uplift of people in other parts of the country and in foreign lands, spending millions of dollars in this work, yet he has not endeavored to improve the conditions of the more than 6000 employees in the company with which he is connected." All we can say is that if he hasn't, someone has, as our series of articles on the sociological work of the Colorado Fuel & Iron Co. amply proves. But, unintentionally, the report is fair, for in blaming him later for his direction of the Fuel Co., it incidentally must give him credit for the good work that company has done to ameliorate conditions in the mine villages.

Representative Whittacre of Columbiana County, Ohio, has introduced a bill to relieve conditions in that state by requiring the state board of administration to buy only Ohio coal. Apparently Ohio is on the high road to nullification. Logically the next move would be to put a tax on coal imported from neighboring states.

Discussion By Readers

Drying Washed Coal

Letter No. 5—Several replies have been written to the letter of John Hammond, COAL AGE, Nov. 28, p. 879. All of these articles have justly conceded the superiority of the centrifugal drier over all other known methods.

The reduction in percentage of moisture obtained by this method of drying, however, cannot be stated in a general way to be a certain amount, without giving all the conditions and factors entering into the case. In order to definitely control the moisture content of the product delivered from a centrifugal machine, it must at once be clear to anyone that four things are absolutely essential; namely, control of the speed of the machine; control of the capacity of the machine; control of the time that the material is to be held in the drier; and the character of material to be handled.

The speed of the machine will be limited by the strength of the material entering into it and will probably not much exceed 6000 ft. per min., at the periphery. The speed being thus limited, the remaining factor under control should be the time that the material is held in the machine before being discharged. The character of the material handled will largely determine the time of retention in the machine. Experiment only will determine this time factor for a given percentage of reduction of moisture.

Having adopted a suitable time factor and speed for a given material, the *capacity of the machine* is then determined by the size of the container, as it will be clearly seen that a drier is merely the conveyor of a given amount of material as determined by its volume, in a given time. To attain control of the time factor in a large-capacity machine was the problem confronting many experimenters in coal drying. In small-capacity machines used for drying sugar, salt, sulphate, etc., this control is obtained by loading the machine while at rest, then running it for a definite time until the moisture content was reduced the desired amount. The machine was then stopped and unloaded. Such a method is, of course, out of the question with the large capacities required in drying coal.

Carl Wendell, a graduate mining engineer of Frieberg, Germany, and now experimental engineer for the Illinois Steel Co., began the serious study of the methods of drying washed coal for the coke ovens in the steel plant five or six years ago. After building five different machines and spending some twenty thousand dollars, he finally developed a machine of large capacity with continuous feed and continuous discharge. In this drier, the time factor was absolutely under control. It is interesting to note that Mr. Wendell experimented with cone-type machines fed at the apex and depending on the centrifugal force developed by the rotation to slowly drive the coal down or up the slopes, while at the same time driving off the moisture. He experimented with cones having the apex upward and driving the coal downward, as well as with inverted cones that drove the coal upward. Due to the clogging and building up of the material and the erratic discharge,

however, this method was finally abandoned. Plows and scrapers were tried to remove the material from the screens; but these wore the screens excessively and, as can be readily conceived, gave no control of the time or of the moisture content and consumed an excessive amount of power in scraping off the packed material.

Mr. Wendell finally built two machines, both of which gave absolute control of the time factor and entirely did away with scraping or plowing in the discharge of the material. The two machines, however, accomplished this end in different ways. The last one built was a complete success for large capacities and is now made so that it is possible to retain the material from a few seconds to a quarter of an hour or longer, by simple gear changes.

Three of these machines have been installed in the Woodward Iron Co.'s plant at Woodward, Ala. They are handling from 50 to 60 tons per hour. They retain the coal, approximately, one-half minute and reduce the moisture from 30 and 50 per cent. to an average of about 8 per cent., which is the amount required by the coke-oven department of the Woodward Co., to obtain the best results in the ovens. The coal is driven at a speed of, approximately, 6000 ft. per min., in these machines. The moisture in this coal could be further reduced, in the two ways mentioned above; namely, by speeding up the machine to 7000 or 8000 ft. per min. or by increasing the length of time in the machines. It must be borne in mind, however, that the external moisture in any material is all that can be reduced by the centrifugal process. Water of composition is not expelled by this process.

Coke-oven men differ in their ideas as to what is the proper percentage of moisture in coal for coking purposes. The moisture content seems to affect both the quantity of the byproducts and the quality of the coke produced. The centrifugal dryer has demonstrated its ability to produce a product of proper moisture content for any reasonable demand of coke-oven operators.

FRANK RASMUSSEN, Engineer.

Evanston, Ill.

Longwall in the Pittsburgh Seam

Letter No. 2—In his letter referring to the recent discussion of the question of the adaptation of the longwall system of mining to work in the Pittsburgh seam, COAL AGE, Feb. 13, p. 303, G. R. Waddell suggests that this system should be adopted and used in working the eastern Ohio No. 8 seam. He quotes S. A. Taylor as being opposed to its adoption and saying that "the roof breaks up too high, sometimes as much as twenty feet, and the bottom is too soft." That statement is true over practically the whole district.

Everybody knows that the overlying strata have an important bearing on the success of longwall mining; but what Mr. Taylor referred to was that, anywhere from three to thirty feet above the coal in this seam, is en-

countered a limestone stratum that refuses to break, being too thick. Consequently, when the coal has been mined without leaving sufficient pillars and the strata immediately above this coal have caved, the thick limestone supporting the upper measures gradually sags or bends under the enormous weight, until it comes to rest on the mine floor. This bending exerts a great pressure on the face of the live workings—not the moderate roof pressure that Mr. Waddell describes, but a heavy squeeze that closes all entries and proves disastrous to the mine. All roof falls that occur in the No. 8 seam, in eastern Ohio, only break to the limestone. On numerous occasions, operators have tried to get a break of this same limestone, in order to stop the progress of the squeeze over the live workings but have had little success.

Mr. Waddell appears to criticize the mine officials of this district; and suggests some ignorance on their part. Allow me to say that, while there are some officials in the district whose knowledge of mining would warrant such an aspersion, the district also possesses many brainy and capable coal men.

Invariably when a superintendent and mine foreman from Pennsylvania take charge of a mine, either in this district or the West Virginia Panhandle, they want to start to draw the pillars as they do in the same seam in the Pittsburgh district. Let some of the men from there who have tried it testify as to the results.

I have had a varied experience in eastern Ohio and the Panhandle mines and have been observant of conditions and results and worked along recognized progressive lines. At present I am operating not farther than eight miles from Mr. Waddell, and if he can show me a mine that is being worked on either the longwall or the room-and-pillar system and getting 85 per cent. of the coal in eastern Ohio No. 8 seam, I will be grateful; but he will have to show me.

ENGINEER.

Wheeling, W. Va.

Stopping Payroll Leaks

Letter No. 2—In addition to the interesting suggestions given by J. Kenvin, in reference to stopping payroll leaks, COAL AGE, Feb. 20, p. 343, I would like to add the following:

The foremen's timebook should be used but once. If the company pays twice a month, the timebook should run from the first to the fifteenth of the month, and from the sixteenth to the thirty-first, inclusive. These books should contain as few leaves as possible so that they can be filed away in a small space, after the records have been entered on the payroll sheet. Each foreman should turn in his book to the office on the first and the sixteenth days of the month and receive a new book for his use until the next pay.

The payroll clerk should check up the books turned in by the foreman with the daily reports to see that they agree, and care should be taken to place each item of expense in its proper column so that a full account can be kept of the payroll expenditures. It too often happens that not sufficient care is taken in the making out of the daily report and the proper distribution of the time is left for the foreman's monthly report.

Every mine superintendent who does his duty makes a careful inspection of the cost-sheet each day the mine is

running. By this means, he knows the actual cost of producing coal each day; and if this cost of production is excessive, he will investigate immediately to ascertain the cause. It frequently develops that the daily cost of production at a mine fluctuates or is temporarily increased by the habit that some mine foremen have of turning in time for men that has been omitted from a previous report. There is no question but that the time worked should be entered on the payroll, in order that men will not lose their pay because of the forgetfulness of a boss; but this should come to the superintendent's attention, that more care may be exercised in the making out of future reports. Instances of this kind that occurred in my own experience were referred to the superintendent for authority to make the entry on the payroll. If this is not required, the opportunity is offered for padding the payroll.

With a little care and the use of proper blanks, the daily cost-sheet can be kept in a manner that will show at a glance the cost of production per ton of coal mined, for each day. The arrangement of the daily report should be such as to divide the expense in the same manner as required by the payroll-sheet. It is a good plan to make a close comparison between the weigh-sheet and the daily report.

As has been suggested, it is the duty of the engineer to check all measurements of contract work. He should make these checks from his own spads driven in the roof and not rely upon paint marks, as these are often changed by men disposed to crooked work. There is not the same danger of an engineer's spad being changed, as any meddling with this would at once be detected by the engineer. Instances have come to my notice where paint marks have been altered and the mistake has not been discovered until some time later when the reports of yardage were compared with map measurements and found to considerably exceed the actual distance driven.

JOHN H. DYE,
Mining Engineer.

Willard, Ky.

Mining Laws, Legislation and Mine Regulations

Letter No. 36—In a recent letter, COAL AGE, Feb. 13, p. 303, discussing needed mining laws and legislation, George D. Evans referred to the anthracite law of Pennsylvania requiring that an applicant for a mine-foreman's certificate must not only be able to pass the examination, but must also give satisfactory evidence that he has had at least "five years' practical experience as a miner," which he stated was then being contested in the Pennsylvania courts to determine the intended meaning of the words "practical experience as a miner."

In this connection, it will be of interest to know that in order to qualify for the position of mine foreman or assistant mine foreman in an anthracite mine in Pennsylvania, one need not have had the five years' practical experience in mining coal at the face or cutting coal directly from the vein, as demanded in the law. This conclusion was reached lately by the Court of Common Pleas of Dauphin County, Penn., in the case of Matthews vs. Roderick. The suit was brought to enjoin issuance of certificates to 142 persons who had passed examinations for mine foremanship and assistant foremanship, but

had not had the specific experience mentioned in the law.

In dismissing this suit, the court said: "The statute, however, does not, in terms, declare what is necessary to constitute the five years' practical experience as miners. It does not say that this experience must be in cutting coal or in the doing of any particular work in a mine. A person successfully passing an examination must satisfy the board of examiners that he has had five years' practical experience as a miner, and each board is left to determine in the case of each applicant whether he has had the statutory practical experience to entitle him to a certificate of qualification to act as a mine foreman or assistant mine foreman. The members of these boards must possess practical experience as miners or as owners, operators or superintendents of mines, and the legislature seems to have left to the discretion of the several boards the determination of what the practical experience really is."

A. L. H. STREET,
Attorney at law.

St. Paul, Minn.

Letter No. 37—The interesting letters relating to mine laws and legislation that have appeared in COAL AGE for some time past have, unquestionably, been of educational value to the large number of readers. Mining law is one of the subjects that receives the least notice, while it should be given the closest attention by all who are engaged in that industry. It is the recognized rule of procedure by which the government seeks to regulate and establish the safety and preservation of life and property by imposing certain duties on both workmen and officials.

The workman is prone to regard some of the law's requirements as being restrictive of his liberties and an infringement of his rights, while the mine official, under pretext of enforcing the law as affecting the workman, frequently adopts a course of procedure that tends to emphasize this opinion. If all parties concerned would carefully read and study the different letters published on this subject they would see the necessity of making and complying with orders that are conducive to the safety and welfare of mine workers and much of the misunderstanding that now exists would be avoided.

The mining laws of every state contain defects and discrepancies and these could not be wholly eliminated, even if the laws were framed by our most practical and scientific mining men. Such defects and discrepancies, however, are of small consequence so long as it is possible to discern and know the meaning or spirit of the law.

In many instances, the interpretation of the law will depend on the desire of both workmen and officials to "play safe" as Sir Reynolds so aptly expressed it, COAL AGE, Jan. 9, p. 93. When, however, one part of the law is inconsistent with and contradicts another part, a compliance with such an inconsistency that will endanger life or property may justly be regarded as criminal if intentional.

Such an inconsistency exists in the bituminous mining law of Pennsylvania (1911). For example, Art. 10, Sec. 1, reads:

The use of open lights is prohibited in any entry, airway, traveling way, room, or any other working place where explosive gas is being generated in such quantity as can be detected by an approved safety lamp, also in pillar workings where a sudden inflow of explosive gas is likely to be encountered, and all such places shall be worked exclusively with locked safety lamps.

Again, Art. 28, Sec. 2, reads:

The provisions of this act as to mines, or portions of a mine, generating explosive gas in quantities sufficient to be detected by an approved safety lamp shall not apply to any mine wherein explosive gas is being generated only in live entries.

In Art. 10, the mine inspector is given discretionary power with respect to compelling the use of locked safety lamps in places where his judgment deems their use is necessary, but he is not given discretionary power to permit their *nonuse* in places where they are required by law. However, Art. 28 seems to limit the discretionary power of the inspector granted in Art. 10, so that, if the mine management desires to work such places with open lights, they can do so and it is beyond the power of the inspector to prevent such action.

That compliance with such a law would be productive of harm was clearly demonstrated in the Cincinnati mine explosion, Apr. 23, 1913. It is no argument to urge in support of this act that ample ventilation can be kept up to the face by means of brattice, as this precaution was taken throughout the mine in the case just mentioned, and yet 96 lives were lost. The explosion occurred in an entry that was not generating explosive gas, COAL AGE, Vol. 3, p. 807. I regard this as a strong argument against the use of *mixed lights* in mining, which so many of our expert mining men and mining journals seem to favor.

One writer, commenting on this disaster, states that the mine foreman was at fault in not complying with General Rule 18, of the bituminous law, which states that in such places "a borehole shall be kept not less than three feet in advance of the face of the work, or three feet in advance of any shot-hole drilled for a blast to be fired in"; but this requirement refers to "mines wherein explosive gas is generated in dangerous quantities." Under the conditions, the mine foreman could not be held legally responsible, as he was within the law. I may add that a compliance with Sec. 1, of Art. 28 is equally if not more dangerous than that of Sec. 2; but the former is not contradictory of the provisions of any previous article.

I believe that all practical mining men will agree with the statement that the operation of a mine, under the provisions of Art. 28, is not consistent with the general spirit of the law, in that it restricts the discretionary powers of the inspectors in an important particular and renders their efforts to safeguard life and property practically useless, and legalizes action on the part of the mine management that would be criminal if it were not for this section of the law.

No matter how conscientious and scrupulous the mine foreman and the inspector may be, in regard to the enforcement of the precautions for safety; no matter how well they may know that such procedure may be productive of the most disastrous results, they can be over-ridden by the operator, because the law sanctions his action. If the Department of Mines of Pennsylvania earnestly desires to eliminate or reduce accidents, it would be well to see that the law is expurgated of such inconsistencies and contradictions and that the mine foreman and inspector are not handicapped by the statutory provisions of such incongruities.

I. C. PARFITT,
Assistant Foreman.

Jerome, Pa.

Tractive Effort vs. Draw-Bar Pull

In connection with the excellent explanation given of the tractive effort a locomotive can exert, COAL AGE, Dec. 5, p. 917, I thought the following definitions of the terms "tractive effort" and "draw-bar pull" would help to further elucidate their meaning and use.

The *tractive effort* of a locomotive is the force exerted by the motors at the wheel rim. The *draw-bar pull* of a locomotive is the force it is able to exert to pull a trailing load.

When the locomotive is on a level track the tractive effort is equal to the draw-bar pull plus the friction of the locomotive, which consists of wheel friction, journal and axle-bearing friction, and windage. The windage is not much of an item in a mine locomotive. The tractive-effort curves of the motors most always include the gear losses, so that the difference between the *input* to the motors and the power represented by the tractive effort consists of motor and gear losses.

On a grade the difference between the tractive effort and the draw-bar pull is the same as for a level, plus 20 lb. per ton of locomotive, for each 1 per cent. of grade. It will be readily seen that a grade will finally be reached when the part of the tractive effort due to grade will

just balance the adhesion of the wheel to the track when the draw-bar pull the locomotive can exert becomes zero. Any steeper grade will cause the wheels to slip and the locomotive will slide down the grade.

So far, I have assumed that the locomotive is traveling at a constant rate of speed. During acceleration the portion of the tractive effort necessary to accelerate the locomotive will not be available for draw-bar pull. This acceleration will absorb about 100 lb. per ton for each one mile per hour per second rate of acceleration, which will give the same loss of draw-bar pull that a 5 per cent. grade will produce. However, the rates of acceleration in mine service are usually only 0.2 to 0.25 mile per hour per second, so that this loss is not great.

The draw-bar pull or, as you state, "tractive force," is therefore limited by the weight of the locomotive, the adhesion of its wheels to the track and the grade of the road, while the tractive effort is only limited by the capacity of the motors. As you have already said, the tractive effort may be very much greater than the draw-bar pull. This may be caused by the motorman holding his brakes on while notching up, which is a bad and dangerous practice, and is one of the evils resulting from "overmotoring" a locomotive.

GRAHAM BRIGHT.

East Pittsburgh, Penn.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

MINE-LOCOMOTIVE HAULAGE

A mine locomotive consists of a heavy iron frame or bed mounted on wheels, which are operated through a system of gears by steam or air cylinders or powerful electric motors built in the frame.

It is common in mines to speak of the locomotive as the "mine motor," "hauling motor," or simply "motor." It is necessary, however, to avoid confusion, to distinguish between the **locomotive**, which is the machine, and the **motor** by which it is driven.

Types of Mine Locomotives—Mine locomotives are classified, according to the power used to drive them, as **steam**, **compressed air** or **electric**, all of which are employed under the varying conditions in mining.

Adaptation to Mine Use—The use of steam locomotives in coal mining is very limited owing to the annoyance and danger arising from the presence of the exhaust steam and gases in the mine entries. Such locomotives, however, are frequently found employed in small drift openings, but rarely in other cases.

The choice between compressed-air and electric locomotives for mine use is almost wholly governed by the question of relative cost of installation and maintenance and the adaptation of these two kinds of power to the various operations and requirements in the mine. Obviously, it would not be advisable, generally, to install and operate two large power plants with their separate systems of transmission in the mine where one such installation will perform the work that is required.

Where a compressed-air plant is already in operation supplying power to drills and coal-cutting machines, compressed-air locomotives can be used with greater economy for hauling the coal, supplies and refuse in the mine. The same principle holds true in respect to electricity. Where this power is already in use for operating machines at the working face it will be advantageous and more economical to employ electric locomotives for haulage purposes.

Compressed Air, Advantages and Disadvantages—The air exhausted from compressed-air machines is a decided advantage in the ventilation of headings and chambers driven ahead of the air. On the other hand, the system of pipes required to conduct the power from the compressors on the surface to the machines at the face is cumbersome and rigid, which makes it comparatively difficult to extend, alter, repair and maintain. In case of accident, this system may furnish the air needed to sustain the lives of entombed miners cut off from the regular air supply.

Electricity, Advantages and Disadvantages—The electric transmission of power possesses a great advantage in the flexibility of the system, which makes it easy to install, extend, alter and repair. The use of electricity in gaseous mines is always attended with more or less danger owing to the possibility of the gas being ignited by the sparking of wires, switches or brushes. There is also the danger of shock to men and animals.

The Coal Age Pocket Book

Hauling Capacity of Mine Locomotives—The load that a locomotive will haul depends on the **grade of the track**; the **weight of the locomotive** resting on the driving wheels; the **adhesion of the wheels** to the rails and the condition of the track and general rolling stock or mine cars hauled, assuming of course that the power of the motors is proportioned to the weight on the drivers and their adhesion to the rails, since these two factors practically determine and limit the **draw-bar pull** of the locomotive or its hauling capacity.

Tractive Effort of Locomotive—The tractive effort of a locomotive is the effort it can exert to move the entire load, which includes its own weight in addition to that of the cars hauled.

Assuming what is true in a properly designed mine locomotive that the effective power of its motors is in proportion to the weight on the drivers, the tractive effort, which is the force of the motors available at the circumference of the drivers, cannot exceed the adhesion of the wheels to the rails or the **wheels would slip** and the locomotive and its train would not be moved.

The adhesion of the wheels to the rails will vary according to the material of the wheels and rails and the presence of any lubricating matter, as water, clay, grease, etc. The **coefficient of friction**, in haulage, may vary from 0.15 to 0.20, depending on conditions; but, in coal mining practice, it is only safe to assume a value of, say 0.16, which makes the tractive effort practically one-sixth of the weight on the drivers.

Mine locomotives are commonly built so that the entire weight of the locomotive rests on the driving wheels. The foregoing makes clear why mine locomotives are rated on a basis of their weight in tons and not on the horsepower of their motors, since the **tonnage of a locomotive** indicates its possible tractive effort from which its hauling capacity can be calculated in accordance with the known data in regard to grade and conditions of track, rolling stock, etc., which together determine the track resistance.

Track Resistance—What is commonly called "track resistance" includes all the frictional resistances (outside the motor gears) that oppose the movement of the locomotive and its train on a level track. It is estimated in pounds per ton of moving load.

Track resistance, in mines, may be safely estimated as, say 50 lb. per ton of moving load. With good rolling stock (14-in. wheels), proper lubrication and well ballasted track, this may be reduced to 40 lb. per ton, while improved car wheels with ball or roller bearings make it possible to estimate on a track resistance of 30 or even 20 lb. per ton, in exceptional cases.

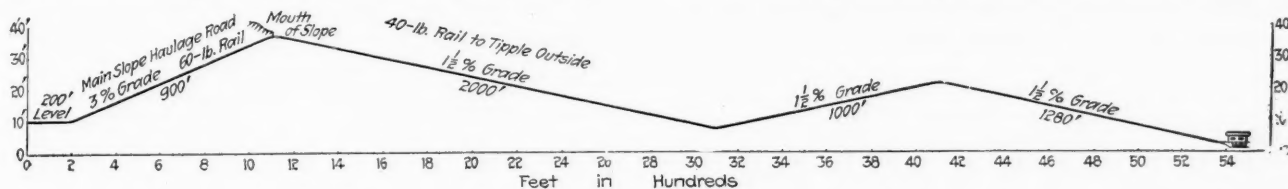
Grade Resistance—When haulage is performed on an incline, the weight of the load resting on the incline produces a pull commonly called the "gravity pull" acting in a line parallel to the track. For grades not exceeding 10 per cent., the gravity pull or grade resistance is $0.01 \times 2000 = 20$ lb. per ton for each per cent. of grade.

Inquiries of General Interest

Electric-Haulage Problem

I desire some information on the installation of an electric-haulage plant at our mines. At the present time, we are hauling the coal from the slope to the tippie, a distance of nearly a mile, using for this purpose a steam locomotive. We desire such information as will enable us to purchase an equipment that will prove satisfactory.

It is proposed to haul the coal from the siding at the bottom of the slope, in trips of 30 cars. The empty cars each weigh one ton and have a capacity of 1.5 tons. This will make the total weight of the loaded trip $30(1 + 1.5) = 75$ tons. The accompanying profile of the road, extending from the siding at the slope bottom in the mine to the tippie where the coal is loaded into the railroad cars, shows the length and grade of each portion of the track and the weight of rail in use at the present time.



PROFILE OF TRACK FROM BOTTOM OF SLOPE TO TIPPLE

Kindly state the size of electric motor that will be required for this haul; also the weight of rail and style of rail bond that should be used, the size of trolley wire required for the transmission of the power from the generator to the mine, and the required horsepower of the generator and boiler.

JOHN E. KELLEY, Supt.,
Big Four Coal Co.

Boonville, Ind.

The first step is to estimate the weight of locomotive required to haul a loaded trip of 75 tons up a 3-per cent. grade, under ordinary mining conditions. In mining practice, it is not safe to estimate on what is commonly called the "track resistance" as being less than 50 lb. per ton. To this must be added 20 lb. per ton for each per cent. of grade or, in this case, $3 \times 20 = 60$ lb. grade resistance, which makes the total resistance $50 + 60 = 110$ lb. per ton of total moving load including the locomotive.

Also, in mining practice, the coefficient of adhesion of the wheels to the rails should not be estimated as exceeding 0.16, which makes the tractive effort that the locomotive can exert to move itself and the loaded trip $0.16 \times 2000 = 320$ lb. per ton. Then, since this tractive effort of the locomotive must be equal to the total resistance of the entire moving load including the locomotive,

$$320 W_m = 110(W_m + W_t) = 110 W_m + 110 W_t$$

$$\text{and } W_m = \frac{110 W_t}{320 - 110} = \frac{110 \times 75}{210} = \text{say } 40 \text{ tons}$$

This shows conclusively that, under the adverse conditions common in coal mining, a 40-ton locomotive would

be required to haul a loaded trip of 75 tons up a 3-per cent. slope. This of course provides for the worst conditions that are liable to exist, in respect to both the track and rolling stock in the mine.

Before going further, it will be well to estimate the weight of locomotive that will be required to haul the same loaded trip on the $1\frac{1}{2}$ -per cent. grades outside of the mine. In this case, the track resistance, as before, is 50 lb. per ton, but the grade resistance is $1.5 \times 20 = 30$ lb. per ton, which makes the total resistance $50 + 30 = 80$ lb. per ton. This gives for the required weight of the locomotive

$$W_m = \frac{80 \times 75}{320 - 80} = 25 \text{ tons}$$

We would suggest here that the same weight of locomotive will haul practically two-thirds of the number of

cars up the slope that it can handle on the outside grades, as shown by transposing the formula previously given and finding the load that a locomotive can be expected to haul regularly up grades of $1\frac{1}{2}$ and 3 per cent., respectively, under the conditions named, thus,

On a 3-per cent. grade:

tractive effort of locomotive, 320 lb. per ton;
track and grade resistance, 80 lb. per ton.

$$\text{Loaded trip, } W_t = \frac{320 - 110}{110} W_m = 1.9 W_m$$

On a $1\frac{1}{2}$ -per cent. grade:

tractive effort of locomotive, 320 lb. per ton;
track and grade resistance, 80 lb. per ton.

$$\text{Loaded trip, } W_t = \frac{320 - 80}{80} W_m = 3 W_m$$

For this reason, it might be well to provide a siding at the top of the slope that will hold 20 or 40 cars as desired, and make three trips on the slope for every two trips to the tippie, using a 25-ton locomotive for the entire work.

So far, we have only considered relative weights of the locomotive and the load it can be expected to handle regularly and satisfactorily on different grades, under the worst conditions that are liable to exist or arise in mining practice. It is important to remember that having assumed a coefficient expressing the adhesion of the wheels to the rails, it is the weight of the locomotive that determines the tractive effort the machine can exert, regardless of the power of the motors or engines with which it is equipped. It is a fatal mistake to equip a locomotive with more power than its weight will permit it to utilize.

(To be continued in next issue)

Examination Questions

Hoisting Engineers' Examination Held at Terre Haute, Ind., Sept. 10, 1914

(Selected Questions)

Ques.—(a) Why should scale never be allowed to accumulate in a boiler? (b) How can the bad effects of scaling be prevented?

Ans.—(a) The formation of scale in a boiler prevents, to a large degree, the transmission of heat from the furnace to the water in the boiler and decreases, to that extent, the production of steam per pound of fuel burned and lowers the efficiency of the boiler. Again, the presence of scale in a boiler has a tendency to induce over-firing, with the result that the fireplates of the boiler are often blistered or bulged. When this occurs there is danger that the cracking of the scale may permit the water to gain access to a red-hot plate, which would generally cause the explosion of the boiler. The formation of scale has, also, the effect to deteriorate the iron and weaken the boiler.

(b) The bad effects of scaling are best prevented by avoiding the formation of scale, by purifying the feed water used in the boiler. The purification of the feed water will depend on the impurities it contains. Water containing sediment held in suspension should be permitted to stand awhile in settling tanks from which it can be drawn for use as required. The precipitation of sediment and organic matter in water is facilitated by heating or boiling. Acid feed waters must be treated with salts that will neutralize the acids and prevent them from attacking the iron of the boiler.

In general practice, the purification of feed water is accomplished by settling, feed-water heaters, the use of soda ash to neutralize the acid of the water, or the use of graphite or petroleum (coal oil) either of which has the effect to disintegrate the scale and prevent, to a large extent, its adhesion to the iron plates of the boiler. The powdered graphite or the oil is introduced into the feed water before it is pumped into the boiler. Where scale forms readily, the boiler should be blown off at regular intervals, say at least once a week. In some cases, the results are improved by blowing off 3 or 4 inches of the water each night.

Ques.—(a) What is the purpose of a flywheel on an engine? (b) What is the effect if a flywheel is too light for its work? (c) What is the effect if the flywheel is too heavy?

Ans.—(a) The purpose of a flywheel of an engine is to regulate the motion of the engine and render its speed uniform, by virtue of the stored energy of the wheel.

(b) If the flywheel is too light for its work, it does not properly regulate the motion of the engine, which continues to have a variable speed of rotation, running slower or faster as the load is increased or decreased.

(c) If the flywheel is too heavy, it renders the work of the engine heavy and laborious, absorbing more ener-

gy than is required for the purpose intended and increasing the time for acceleration and retardation when starting and stopping the engine. The excessive weight of the wheel also adds to the wear and tear of the machinery.

Ques.—(a) For what purpose are bearings bushed? (b) What metals are generally used for this purpose, and why?

Ans.—(a) The purpose of bushing machine journals or bearings is chiefly to reduce the friction and to overcome the effects of wear by making it possible to replace the bearings when worn, by a new one inserted in its place.

(b) The metals most commonly used in bushing are babbitt, brass or bronze. Various compositions of copper, tin and zinc are used for this purpose. The composition commonly known as "babbitt metal" is an alloy of copper, tin and antimony. This alloy is much used because of its antifrictional properties and because of the ease with which it can be molded about a journal or bearing.

Ques.—Explain why it is economical, in many cases in mining practice, to employ compressed air or electricity in place of steam power.

Ans.—In the use of compressed air or electricity, it is possible to transmit the power over considerable distances more conveniently and with less loss than in the use of steam. The transmission of steam power for any considerable distance is not only attended with much loss, owing to condensation in the pipe line, but, in mine entries, the radiation of the heat from the pipes and the presence of the exhaust steam in the workings are objectionable. Moreover, the steam has a bad effect on the mine roof, in many cases.

Ques.—What are the advantages and disadvantages of using electricity for power or other purposes, in coal mining?

Ans.—For answer to this question, see Study Course in Coal Mining, p. 434.

Ques.—(a) If a pump is located at the bottom of a shaft 300 ft. deep, what is the pressure per square inch when the pump is in operation? (b) How many gallons of water will a tank hold, the diameter of the tank being 53 in. and its height 9 ft. 11 in.?

Ans.—(a) The pump's static head is $300 \times 0.434 = 130.2$ lb. per sq.in. The pressure when the pump is in operation cannot be calculated without knowing the size of the column pipe and the quantity of water discharged. For example, assuming a discharge of 250 gal. per min. through a 4-in. column pipe, in this case, the effective head when the pump is in operation is

$$h_1 = h + \frac{G^2 h}{800 d^5} = 300 + \frac{250^2 \times 300}{800 \times 4^5} = \text{say } 330 \text{ ft.}$$

(b) This tank is a cylinder having a sectional area of $0.7854 \times 53^2 = 2206 +$ sq.in. Its depth is $9 \times 12 + 11 = 119$ in. The capacity of the tank in gallons is, therefore, $2206 \times 119 \div 231 = 1136$ gal.

Coal and Coke News

Harrisburg, Penn.

Governor Brumbaugh and Attorney General Brown have prepared tentative drafts of six bills designed, in a comprehensive fashion, to carry into effect the state administration's idea as to a workmen's compensation act.

They have also prepared the proposed amendments to the constitution, which would, if adopted by the people, give the Legislature power to enact a compulsory compensation law. The law proposed for this session is elective. The constitutional amendment in question has already passed one session of the Legislature. If it be passed by the present session, the people may vote it into the constitution next November.

The six bills, as tentatively framed by the attorney general are: First, the workmen's compensation act, which provides a schedule of compensation at the rate of 50 per cent. on the wages received for varying periods. This bill provides that the act shall apply to all accidents occurring within the state, irrespective of place where the contract for hiring was made, renewed or extended.

Second: An act creating a bureau to enforce the workmen's compensation act.

Third: An act creating a state insurance fund.

Fourth: An act regulating policies of insurance against liability arising under Article 3, of the workmen's compensation act.

Fifth: An act creating and authorizing mutual liability associations.

Sixth: An act to overcome all constitutional objections to the exemption of any class of labor.

Compensation for injuries: For total disability, 50 per cent. of wages for first 500 weeks; maximum, \$10 a week; minimum, \$5 a week. For partial disability, 50 per cent. of the difference between the wages received at the time of injury and the earning power thereafter; maximum, \$10 a week; maximum period, 300 weeks.

Compensation for death: Minimum, \$1.50 a week to dependent brother or sister; maximum, \$12 a week to widow with four children; period of death compensation 300 weeks; death compensation to children until they reach the age of 16.

It is estimated that there will be 60,000 compensable accidents annually. The compensation bill enlarges the right of an employee to recover in an action at law against his employer.

In case of the injury or death of an employee, it shall not be a defense of the employer in any action that the injury was caused by the negligence of a fellow employee, or that the employee had assumed the risk of the injury, or that the injury was caused in any degree by the negligence of such employee, unless it be established that the injury was caused by such employee's intoxication or by his reckless indifference to danger. The bill provides that the burden of proving such intoxication or reckless indifference shall be upon the defendant and the question shall be one of fact to be determined by a jury.

Employer Is Liable for All Negligence

The employer shall be liable for the negligence of all employees while acting within the scope of their employment, including engineers, miners, mine foremen, firebosses, mine superintendents, officers of vessels, etc., and all other employees licensed by the state or other governmental authority if the employer shall be allowed by law the right of free selection of such employees from the class of persons thus licensed.

This is a very perplexing question since the miners are employed upon examination in the anthracite region under state auspices, and other mine employees in both regions are hired by foremen who are chosen by state examination, the operators cannot be held responsible for the payment for injury or loss of life, and a decision of the Supreme Court recognizes the responsibility of the state in employment, because of the state examination.

Compensation to alien dependent widows and children not residents of the United States shall be the same in amount as is provided in each case for residents, except that, at any time within one year after the death of injured person, the employer may, at his option, commute all future installments of compensation to be paid alien dependents not residents of

the United States by paying such alien dependent two-thirds of the total amount of such future installments. Alien widowers, parents, brothers and sisters not residents of the United States shall not be entitled to any compensation.

Coal operators while pleased in some respects with the bill will no doubt make a strenuous fight against the provision of the employers' law defenses, which should be retained to him in cases where the employee does not elect to accept compensation under the act.

The expense of administration of the act is apparently to be borne by the state for only two years. The employer will be compelled to pay an insurance company or state commission to conduct the business, which will no doubt be opposed by operators. The provision that after Dec. 31, 1915, the employer will be presumed to have accepted the act is not taken to kindly.

The provision as to payments to aliens will be bitterly fought by the bituminous operators, as they claim this clause is too liberal. As the foreigner with a family benefits equally, apparently, with the American citizen. Today the foreigner enjoys all use of hospitals and other institutions, to which he does not contribute, while his own money is sent back to the old country, and should not participate fully until he becomes an American citizen.

The united forces of the manufacturers and the coal operators, it is expected, will be brought to bear to reduce the concessions granted to workmen in the Brumbaugh bills.

PENNSYLVANIA

Anthracite

Seranton—It is reported that there is over 7000 miles of underground tunnels in the anthracite mines of Pennsylvania. It is said that the Philadelphia & Reading Coal & Iron Co. has more than 800 miles of timbered gangways and that there is a total of 2000 miles of these underground passages in the Schuylkill region alone.

Nesquehoning—The fire that broke out in the inside workings of No. 9 colliery of the Lehigh Coal & Navigation Co. on Christmas day, is burning despite strenuous efforts to extinguish it. Every time the fire has been partly under control the flames would break out again. The company is now sinking a shaft to the burning section and through this opening it is proposed to flood the interior with culm and water. The fire is raging almost under the business section of the town, near the old tunnel plane to Summit Hill.

Plymouth—One lone individual miner, who refused to pay his union dues, was the cause of tying up the Nottingham No. 15 colliery of the Lehigh & Wilkes-Barre Coal Co. on Feb. 25. The mine workers learned that he was in arrears and when he appeared at the head of the shaft he was requested to secure the necessary button, but refused and descended the shaft alone, the workmen refusing to either ride with him or work until he should pay his dues. Thus the action of one man prevented a thousand or more tons of coal being mined and caused a loss of hundreds of dollars in wages.

Pittston—For the second consecutive year, not a single death from the explosion of gas occurred in the mines of the eighth anthracite inspection district in 1914, according to the report of Mine Inspector S. J. Jennings, which was recently forwarded to the Bureau of Mines. The eighth district includes 15 collieries and 27 mines in upper Luzerne County. The production for the year was 3,943,873 tons, as compared with 4,012,653 tons in 1913. There were 37 fatal accidents, all but two occurring inside the mines, which means that for every life lost, 112,682 tons were mined. Forty per cent. of the fatalities were due to falls of roof. The majority of the accidents were of the class termed "avoidable." In 1913 there were 47 fatalities.

Bituminous

Punxsutawney—The scale office and scales and a portion of the tippie of the No. 7 mine of the Berwind-White Co. operated by the Anita Coal Mining Co. were destroyed by dynamite Feb. 24. The office was partly demolished and part of the tippie destroyed and the scales torn to pieces. This is the second attempt to destroy the scale house, and the company officials are unable to determine who the dynamiters may be.

Uniontown—By the recording of deeds in the County Records Office, the long struggle between the H. C. Frick Coke Co. and W. J. Rainey for possession of the Mount Braddock farm and its underlying coal has been ended. With the exception of small strips necessary for the Rainey company in order to mine its coal the surface now belongs to the Frick interests. The Frick company also possesses two-thirds of the coal and the Rainey company owns the remainder. Almost 650 acres are embraced in this tract.

Connellsville—A pronounced improvement has taken place in the Connellsville coke region, and production and shipments are about equal at 270,000 tons weekly. This is the best record since the first half of 1914, but will shortly be exceeded when 418 more ovens will be fired by the H. C. Frick Coke Co. It is believed that the 300,000-ton mark will be reached before the close of the first quarter.

Allanvale—Officials of the Consolidated Coal Co. are pushing the extensive improvement work at the Shaw mines, recently acquired by the company, as if there were no slump in the coal business. A 4-ft. vein of coal is to be developed, and preparations now being made to mine it show that the output will be heavy from the beginning of operations and that the supply will be large and dependable. Company officials state that they intend to be ready for the revival in demand whenever it comes.

WEST VIRGINIA

Fairmont—The grand jury empaneled to inquire into the crimes said to have been committed by strikers recently at Farmington has made a report and returned indictments charging 114 men with various offenses, ranging downward from riot and conspiracy to murder. There may be some trouble in making arrests, in anticipation of which the local company of the national guard is ready for service. Mines Nos. 7 and 9 are to resume work shortly, and this is also expected to bring about a clash. The funeral of Constable W. R. Riggs, who died as the result of a beating received at the hands of the strikers, drew an immense crowd.

Charleston—Following the conviction of Romeo Campi and John H. Riley, fire bosses of the Carlisle mine, where several men were killed a few weeks ago by an explosion, Earle Henry, chief of the Department of Mines, recently announced that any boss found neglecting his duty will have his license revoked. The convicted fire bosses were fined \$50 each and forfeited their licenses. The foreman, Pilkington, who was also indicted was acquitted, but had his license revoked.

Huntington—The two men who pleaded guilty to polluting the waters of the Guyan River were fined a total of \$150. They are employees of the United States Coal & Oil Co. Insufficient evidence caused the discharge of three others arraigned on similar charges. These men had permitted mine water containing sulphur to run into the river killing many fish in the stream.

Plans are now on foot looking to the organization of an association of West Virginia coal operators which will have for its object the extension of export coal trade especially in South America, the standardization of grades of coal, ascertaining and publishing costs of coal production in West Virginia and the dissemination of actual and reliable information about the industry in the state with the elimination of destructive and wasteful competition as far as this purpose can be lawfully accomplished. It is said that permanent headquarters will be established in Huntington, as this point can be more easily reached than any other center from all the mining fields of the state.

ALABAMA

Montgomery—Governor Henderson announces that he will soon make an inspection of the conditions in the mining camps operated with convict labor. It is expected that he will make some suggestions relative to the management of convicts to the Legislature when it reassembles in July.

KENTUCKY

St. Charles—In spite of warnings which were posted by alleged "possum hunters" near the Carbondale mines, white miners are being employed daily and for the present the mine is working full force and full time. It is not expected that the warnings will make trouble.

Baskett—The Pittsburg Coal Co. on Feb. 20 made the best run of the year, with an output of 437 tons of coal. Ninety men worked 8 hours and loaded 14 railroad cars. The best one-day record ever made at the mine was 637 tons. The company has a contract which will keep the mine going all summer and by Apr. 1 it hopes to have an output averaging 700 tons a day.

Rockport—The Rockport Coal Co. has closed its mines here for an indefinite period. This throws 125 men out of work.

Central City—The impending shutdown of the mines of the Central Coal & Iron Co. has been forestalled by an order from John P. White, president of the United Mine Workers of America, who has suspended the order of the International Executive Board pending a personal investigation of the controversy involving the mines of the company and the union workmen, which involves the matter of arbitration. The Central company has orders which will permit operation of the mines four days out of the week.

OHIO

Columbus—The Green anti-screen law passed by the Ohio legislature a year ago has been held constitutional by the United States Supreme Court. The Gallagher bill now pending in the Ohio legislature is aimed at this law. While operators in the Hocking Valley are opposing the amendment, those in eastern Ohio are fighting for its enactment.

J. M. Roan, Ohio chief mine inspector, was called to Zanesville recently to investigate a complaint arising from the use of a new cutting machine in the Elk mine at that place. The machine which has just been placed on the market is an over-cutter and it was averred that the dust left was dangerous as an explosion might result. A specimen of the cuttings has been taken for analysis.

Martins Ferry—The largest number of defendants ever named in a suit filed in the Belmont County Court are involved in an action to quiet the title to real estate, filed for the Ohio River & Western Coal Co. Clarence Armstrong and between 600 and 700 others are the defendants. The petition contains copies of 236 deeds for tracts of coal land in the southern part of Belmont County. The suit is the outgrowth of the sale of the coal land and it was necessary for the company to bring suit to have the titles established in the county records.

INDIANA

Vincennes—The Indian Creek mine, near here, with an output of 3307 tons of coal in eight hours, on Feb. 24 set a new one-day record for the state, eclipsing its previous record by 204 tons. Six hundred men are employed at this mine.

ILLINOIS

O'Fallon—The lives of 150 miners were endangered during the past week at the Ridge Prairie mine, two miles west of here, when fire broke through a brick wall and filled the mine with smoke and gas. The miners at work at this time were only part of the 250 men regularly employed. It is understood that the fire has been burning in the unworked portion of the mine for something like two years. This section, however, had been bricked in and the property was supposed to be safe. Heat from the fire crumbled the brick. A mine-rescue car soon arrived on the scene with experts to advise means of fighting the fire.

Harrisburg—O'Gara coal mine No. 8 recently closed for an indefinite period, throwing 300 men out of employment.

ARKANSAS

Fort Smith—The purchase of the Bache-Benman Coal Syndicate's property by the United Mine Workers of America, District 21, was recently officially called off. The Union deposited \$50,000 early in January as an evidence of good faith. It is believed that Judge Youmans of the United States District Court who named a receiver for the corporation, will not order the property sold.

OKLAHOMA

Muskogee—The Dow Coal Co. recently filed a voluntary petition in bankruptcy in the United States Court. The company's indebtedness is more than \$250,000, while its assets including real estate and machinery and accounts due aggregate \$226,000.

COLORADO

Denver—Two of the four bills intended to increase the authority of the state government in strike disorders recently passed the House. One imposes a penalty for refusing to obey an order issued by the National Guard, and the other imposes a penalty for resisting the militia.

Golden—The State School of Mines recently announced a short course in coal mining to be given from Apr. 5 to May 28. The course is for practical coal miners and is designed for the purpose of giving them an opportunity to improve their work and benefit themselves in their position. The instruction includes mining, chemistry, mathematics, drawing and geology. No fees are to be charged for instruction and the course is open to all.

PERSONALS

Charles B. Levy has retired from the presidency of the Guarantee Coal Co. with which he has been connected for some time.

H. E. Marks, for some years Pittsburgh representative of the Asbestos Protected Metal Co., has been elected vice-president and manager of sales.

M. T. Ashton, Boston sales representative of the Pennsylvania Coal & Coke Corp., has been made Boston manager for D. Nicoll & Company.

James Emery, representing the Pittsburgh-Westmoreland Coal Co. has optioned 1100 acres of coal land, four miles south of Ellsworth, Washington County, Penn. This option was secured at \$320 per acre.

L. W. Brand, of Benton, Ill., was recently appointed receiver for the Hart-Williams Coal Co., of Benton. The assets are given as \$400,000 and the liabilities are \$200,000. The property will be disposed of as soon as possible.

Frank Albright, of Sumner County, Ala., was recently appointed statistician in the State Mining Department by Chief Sylvester, and the appointment confirmed by the governor. Mr. Albright will at once take up the duties of his new office which will be largely clerical.

George M. Jones, of the Geo. M. Jones Co., went to Washington recently as a member of a committee appointed by the Eastern Ohio Coal Operators' Association, to confer with Sec. of Labor Wilson regarding the resumption of operations by the eastern Ohio mines, which have been closed since last April.

George and Harry Whyel, of Uniontown, Penn., have acquired the property of the Killarm Coal Co., located near Monongah, W. Va. The Killarm property was formally owned by Worth Kilpatrick and J. A. Armstrong of Connellsville, and other associates. It consists of approximately 1200 acres of the Pittsburgh seam, and adjoins the property of the Fairmont Coal Co. This coal is in the heart of the Fairmont District and the quality is equal to any of the Fairmont operations. This mine was opened several years ago, and was electrically equipped, tipples, houses, store, and other equipment necessary to operate the same were built, but on account of some local conditions the owners decided not to continue operation, and it has been practically abandoned for several years.

TRADE CATALOGS

The Armstrong Cork & Insulation Co., Pittsburgh, Penn. "Permanent Fortifications." Eight pages, 7x6 in.; illustrated.

The Weinman Pump Mfg. Co., 270-280 Spruce St., Columbus, Ohio. Bulletin No. 51. "Weinman Power Pumps." Illustrated, 16 pp. 6x9 in.

The Waterbury Co., 80 South St., New York City, "Waterbury Fibreclad Wire Rope." Twenty-three pages, 3½x6¼ in.; illustrated.

The Portable Safety Lamp Co., 10 Johnson St., Newark, N. J. "Hubbell Electric Hand Lantern." Leaflet of six pages, 3¼x6 in.; illustrated.

The Atlas Car & Mfg. Co., Cleveland, Ohio. Bulletin No. 1175. "Storage Battery Locomotives, Cranes and Cars." Illustrated, 32 pp., 9¼x6 in.

The Goulds Mfg. Co., Seneca Falls, N. Y., Bulletin No. 119. "Single Stage, Single Suction Centrifugal Pumps." Twelve pages, 7¼x10 in.; illustrated.

NEW PUBLICATIONS

The Oregon Bureau of Mines and Geology. "The Mineral Resources of Oregon"; 161 pp. 6½x10 in., illustrated.

Seventeenth Annual Report of the Bureau of Labor and Industrial Statistics of the State of Virginia, 1914. Bound volume of 192 pages with many tables.

Department of the Interior, U. S. Geological Survey. Bulletin No. 590. "Reconnaissance of the Geology and Oil Prospects of Northwestern Oregon." By C. W. Washburne; 111 pp., 6x9 in., unillustrated.

Department of the Interior, Bureau of Mines, "Metal-Mine Accidents in the United States During the Calendar Year 1913," compiled by Albert H. Fay. Seventy-three pages, 6x9 in.; unillustrated.

Department of the Interior, U. S. Geological Survey. Bulletin 570. "Results of Spirit Leveling in Wisconsin, 1897 to 1914, inclusive," by R. B. Marshall, chief geographer. Eighty-six pages, 6x9 in.; unillustrated.

CONSTRUCTION NEWS

Piedmont, W. Va.—Miller Bros. will shortly open for development a large body of coal on the J. O. J. Greene property which they have purchased.

Somerset, Penn.—Talk of an extension of the Western Maryland R.R. into the Jenner-Quemahoning coal field of Somerset County has been resumed, and predictions have been made that construction work will be started during the coming year.

Piedmont, W. Va.—The Davis Coal & Coke Co. is constructing another power plant at mine No. 52, near Franklin. It will furnish power for operating the mines which will use electrical cutting machines and locomotives for transporting the coal to the tipple.

Cordova, Ala.—The Diamond Coal Co., J. S. Shannon, president, N. L. S. Lunsford, vice-president, announces that it will install electric machinery at the property of the Oak Leaf Coal Co. recently purchased, containing about 1000 acres of coal land and will develop for a capacity of 250 to 500 tons per day of coal.

Steubenville, Ohio—A syndicate has been busy during the past few weeks buying up coal lands in Germany Township, Harrison County, Ohio. The company is purchasing the land outright and expects to start development during the summer. A branch of the Wheeling & Lake Erie will be built to the property.

Chicago, Ill.—The Roberts & Schaefer Co. has just secured contracts for the building of Marcus patent coal tipples for the Harty Coal Co., Mullens, W. Va., the Moffat Coal Co., Oak Creek, Colo., the Henderson Coal Co., Hendersonville, Penn., the Sunnyside Coal Mining Co., Denver, Colo. These plants are modern installations and will be equipped with thorough screening and picking facilities.

Shenandoah, Penn.—James Bros., individual operators, recently struck a 30-ft. bed of mammoth vein anthracite at their stripping operations on Bear Ridge Mountain at Gilberton. This with the rich beds recently discovered on Locust Mountain, gives a large supply of the finest kind of anthracite. The James Bros. will commence the erection of a large breaker at once, giving employment to hundreds of men and boys.

NEW INCORPORATIONS

Hazard, Ky.—The Perry County Block Coal Co. has been organized with a capital stock of \$30,000. The incorporators are R. L. Peters, L. C. Winfrey, and W. E. White.

Rutland, Ohio—The Hobson Coal Co. has been incorporated with a capital stock of \$10,000, by W. E. Williams, David Rees and others, for the purpose of engaging in mining.

Bellaire, Ohio—The Pinney Fork Coal Co. has been incorporated with a capitalization of \$150,000, by Charles F. Bachman, C. W. Dickens, J. F. Johnson, E. M. Findley and W. R. Dorsey.

New Philadelphia, Ohio—The New Philadelphia Coal & Mining Co. has increased its capital stock from \$5000 to \$10,000 and leased several mines belonging to the defunct Goshen Coal Co.

Akron, Ohio—The Akron Coal Co. has taken over the interests of the Loomis Moss Coal Co. and increased its capitalization to \$300,000. The Loomis Moss Coal Co. will retain its incorporation but its capital will be reduced from \$100,000 to \$5000.

Hombre, Ky.—The Wheelerson Coal Co. has been organized with \$50,000 capital with the intention of developing the old McIntyre tract and conducting operations which will give employment to several hundred men. R. M. McIntyre, of Hombre, and P. T. Wheeler and J. B. Allen, of Hazard, are promoters of the company.

Philippi, W. Va.—The W. H. Hauser Co. has been incorporated with a capital stock of \$25,000. The incorporators are E. T. Thompson, W. H. Hauser, Austin C. Merrill, Gordon B. Ramsey, Arthur S. Dayton, all of Philippi. The incorporation is in order to conduct mercantile establishments, trade in real estate, mine coal, drill oil wells, and deal in general stocks and bonds of all kinds.

Emma, Ky.—The Floyd Mining Co. has been organized and incorporated with \$50,000 capital; Ben E. Tate is president and Henry L. Coe, secretary, treasurer and manager. The company will develop 1000 acres, equipping to produce 100 tons daily. A small power plant will be installed, with a 250-volt generator, and an electric cutting machine, boiler, engine, with two breast, or short wall, coal-cutting machines, fan and motor.

INDUSTRIAL NEWS

Charleroi, Penn.—Inspector Charles P. Byrne, of the 21st bituminous district of Pennsylvania, recently submitted his report which shows a total tonnage of 5,502,506 tons for the year ending December 31, 1914.

Pekin, Ill.—The United States District Court at Peoria recently ordered T. W. Dodecker to sell the Champion Mine on the premises on Mar. 10 at 11 a.m., Mr. Dodecker was appointed receiver of the Champion Coal Co. recently.

Washington, D. C.—Increases in the coal rate proposed by the Santa Fé, Illinois Central and Toledo, Peoria & Western railroads from Illinois mines to points in Indiana and Iowa, were recently suspended by the Interstate Commerce Commission.

Columbus, Ohio.—The Ohio Public Utilities Commission has approved of the application of the New York Central System to issue \$70,000,000 four-per cent. bonds to take up a former issue. It is one of the steps toward a reorganization of the system.

El Paso, Tex.—The American railroads' embargo on coal and oil into northern Mexico was recently raised. It had been installed as the result of a dispute between the American roads and the Villa railroad management over the free delivery of American owned equipment.

Pittsburgh, Penn.—The steamers "Thomas Dodsworth" and "F. M. Wallace," of the Monongahela River Consolidated Coal & Coke Co. cleared for Louisville Feb. 27 with tows of coal totaling about 1,200,000 bushels, also two freight barges each carrying 1400 tons of manufactured iron and steel.

San Francisco, Calif.—The Western Fuel Co. in recently answering the Government suit for recovery of \$861,576 in custom duties, which it is alleged the company withdrew through fraudulent methods in the weighing of imported coal, denied practically every allegation made.

Harian, Ky.—A meeting has been called of coal land owners in this section of eastern Kentucky, to start a movement looking toward interesting capital in the construction of a railroad to open up the coal lands in the Clover Fork region of eastern Kentucky and southwest Virginia.

Connellsville, Penn.—The newly organized American Connellsville Coke Co. which recently acquired the properties of the Sunshine Coal & Coke Co. has announced that 400 ovens will be fired shortly. The American Steel Co. of Pittsburgh is interested in the new firm, but it will operate as a merchant coke interest.

Indiana, Penn.—The report of Thomas F. Lowther, mine inspector for the 26th bituminous district comprising the territory within a radius of 20 miles of Indiana, shows a decrease of nearly 700,000 tons in the amount of coal mined in the district in 1914 as compared with the previous year. Depression in business is given as the cause.

Hazleton, Penn.—The report of Mine Inspector, D. J. Roderick of the 11th anthracite mine inspection district for the year 1914, shows that 6,240,102 tons of coal were mined. There were 31 fatalities during the year. The figures for 1913 were 5,875,770 tons with 23 fatalities. The G. B. Markle Co. led in tonnage with 1,704,909 tons. There are 80 mines in the district, 78 of which were in operation.

Charleston, W. Va.—The statement of the shipments of coal and coke over the lines of the Norfolk & Western Ry. for the month of January revealed shipments amounting to 1,957,153 tons, showing a decrease of 127,406 tons from shipments in January of 1914, when 2,084,559 tons were hauled over the line, but an increase of 242,913 tons over the preceding month of December when only 1,714,240 tons were carried.

Portsmouth, Ohio.—A 10-day test of a new variety of washed stoker coal was started recently on the engines of the Norfolk & Western R.R. between Portsmouth and Columbus, under the supervision of J. B. Stewart, of the car allotment commission, and H. S. Walker, road foreman of engines. The tests will be made on the Mallet type of locomotives, and if they prove successful the new coal will be used largely.

Columbus, Ohio.—M. J. Caples, of the Chesapeake and Ohio R.R. system who has been located in Columbus in charge of the proposed line of the company from Portsmouth to Columbus announces that the project has not been abandoned but that it is being held up indefinitely by the uncertain conditions of the financial world. The route for the new line has been laid out and everything waits on the question of financing the project.

Greensburg, Penn.—Chauncey B. Roth, inspector of the 2nd bituminous district, has completed his annual report for 1914, which shows that 8,854,848 tons of coal and 2,190,169 of coke were produced in the county, a decrease in the production of coal as compared with 1913 by 182,621 tons, while that of coke was 525,979 tons. There are 56 mines in the district, 53 of which were in operation. Twenty-six fatal accidents occurred, and 42 non-fatal accidents.

Fayetteville, W. Va.—Railroad men report the most serious freight congestion at tidewater ever known. Practically no coal has been sent to tidewater for over two weeks. In the vicinity of Newport News, the Chesapeake & Ohio is reported to have 12 miles of cars on the siding. The only class of freight that appears to be going through without delay is horses, of which some 50 cars a day are passing over the Chesapeake & Ohio, all these animals being destined for English and French armies.

Charleston, W. Va.—Figures showing the total shipments of coal and coke over the lines of the Chesapeake & Ohio R.R. during December and the year 1914 as a whole, with comparisons with the preceding year, have been made public, showing large increases. During December 1,513,375 tons were shipped, as compared with 1,472,127 tons in December, 1913, while the year showed total shipments of 20,778,880 tons, as compared with 17,490,166 for the preceding year, an increase of 2,488,714 tons.

Knoxville, Tenn.—Following the appointment of Neal Robinson as receiver for the La Follette Coal, Iron & Railway Co. several officers and employees of the company have tendered their resignations which have been accepted. A. D. MacFarlane, chief engineer and assistant manager of operations under the receiver of the La Follette Coal, Iron & Railway Co., has been appointed to immediate charge of operations of the Iron company. It is reported that the Iron company will resume operations under the receiver shortly.

Columbus, Ohio.—A bill for the regulation of freight rates on coal shipments in Ohio has been introduced in the Ohio General Assembly. Senator Vorheis, of Guernsey County, is fathering the measure. The bill goes even farther in the regulation of freight rates than the former announcements showed. The schedule of rates is as follows: For more than 300 miles haul, 85 cents per ton; 225 to 300 miles, 80 cents; 175 to 225 miles, 75 cents; 135 to 175 miles, 70 cents; 100 to 135 miles, 65 cents; 75 to 100 miles, 60 cents; 50 to 75 miles, 50 cents; 35 to 50 miles, 40 cents; 20 to 35 miles, 30 cents and less than 20 miles, 25 cents.

Pittsburgh, Penn.—Including a recent sale of coal lands amounting to about 11,000 acres which was transferred from the Pittsburgh Coal Co. to the Monongahela River Consolidated Coal & Coke Co. on the basis of \$813 per acre, there has been in the past three years about \$30,000,000 of high grade coal lands purchased in the Pittsburgh district, and at a rate of over \$900 per acre. An increasing demand for export coal and an improved demand in the domestic markets, together with a shortage of mine workers as soon as trade revives, is the basis for considerable optimism among the coal operators of the Pittsburgh district.

Pittsburgh, Penn.—Acting upon the knowledge which has been disseminated by United States engineers who have demonstrated that in every million gallons of water drained from the coal mines in the Pittsburgh district, there is at least one ton of valuable chemicals, the H. C. Frick Coke Co. is constructing a chemical laboratory at its Davidson mine near Connellsville for the recovery of the acids and chemicals contained in the water pumped out of that operation every day. From this water it is expected to produce sulphuric acid, paint pigment, hydrates and fertilizer. All of these products are in demand and the supply thereof in the past has been largely drawn from foreign countries.

Coal Trade Reviews

General Review

Anthracite collieries rigidly curtailing production and April circulars prevail. Competition keen on new bituminous contracts. Prompt market continues flat with no indications of any improvement in sight.

The recent cold snap has shaken out a few additional orders for anthracite but it is clear that all sections of the country are heavily overstocked and dealers are concentrating their efforts on working off the surpluses before the summer discount goes into effect. With the individuals pushing hard for business at the April circular, or even occasionally less, the large companies are hard pressed to find a disposal for even their limited output which is very light, as a result of the rigid curtailment policy in effect. A few terminal points are reported congested with coal on which large demurrage may accrue before it can be moved.

Negotiations on new contracts continue to absorb more attention as the season advances. It is developing that competition is exceedingly keen while consumers are more critical as regards quality, and an unusually large number are testing out new coal in an attempt to secure bargains. The buyer is showing no interest at all where purchases can be conveniently delayed, and those closing are proceeding very cautiously.

In the prompt market there has been a renewed inquiry off shore which is relieving the pressure slightly at the loading piers, but some consignment coal is appearing and prices are uneven with a strong tendency to decline. Railroads are cutting down their requisitions still further and mine operations continue on a curtailed basis. The premiums on vessel tonnage to foreign ports still prevail so that the situation in coastwise freights is as uncertain as ever.

While actual conditions remain unchanged in the Pittsburgh district, the attitude of the trade is more discouraging. With the winter practically over, so far as the coal interests are concerned, the operators have a better realization of how exceedingly poor the market situation is; at no time during the past season has there been any flurry in the demand or shortage of supplies, and the outlook in the future is even more uncertain. Lake shippers are showing no interest whatever in buying, and although the periodical opening of navigation is now close at hand, it is evident that practically no tonnage will move in that direction until well into the season, if then.

In Ohio much the same conditions prevail; dealers are busily engaged in cleaning up their stocks, while mine operations are heavily restricted, a great many having closed down indefinitely and others working only one or two days a week. The only encouraging feature in the situation is a tendency to hold coal somewhat closer in order to tone up the market in preparation for negotiations on new contracts.

The Middle Western market has reached a point where it is not believed that even a severe cold snap would serve to stimulate much business. Prices are down to a level where there is no further room for any reduction, while mine operations are still restricted and the large terminals congested with coal, a considerable tonnage of which is on consignment. On new contracts buyers are already feeling around for concessions on last year's figures.

ATLANTIC SEABOARD

BOSTON

Pocahontas and New River market dull and almost featureless. Off-shore inquiry somewhat improved. Georges Creek still in heavy supply but no move as yet on delivered prices. Canvassing in progress for spring orders on anthracite.

Bituminous—About the only new feature in the situation on Hampton Roads coals is a renewal of inquiry for cargoes off-shore. Shippers who have postponed South American delivery in the hope freight rates would ease off are now being required to send coal forward, and this is relieving the pressure somewhat at the loading piers. Coastwise there is practically no change. The clear weather has allowed transpor-

tation to move regularly and receipts are now well up to current demand.

Prices at the distributing points for shipment inland are uneven as compared with a fortnight ago. Cargoes have arrived with unsold balances and quotations have sagged in consequence; \$3.75 was quoted a few days ago, on cars Boston, and so long as such figures are named the prospect is the less favorable for closing yearly contracts on a higher basis.

Advice is still freely given to delay purchases and more than a few buyers appear to be guided by it. Except for a relatively few plants that are working on war orders, textile and shoe factories are on short time and are proceeding very cautiously as to the future. There is almost an entire lack of interest in purchases of coal, especially in cases where they can be postponed for two or three months.

The Georges Creek interests, although under severe curtailment, continue to have accumulations at all points and find that even contract demand is very light. No delivered prices have yet been heard from these shippers, although it would seem they could not be much longer withheld if any buying materializes on the part of their usual consignees.

The Pennsylvania operators, on the other hand, are offering every inducement in the way of uniform price over a year's period but no particularly large contracts have so far been taken from the Southern shippers yet. An amount of Pennsylvania coals of high grade is still coming forward both for testing purposes and to enable certain buyers to keep out of the market on Southern coals.

Water Freights are unchanged; \$1.60 has been paid on coal from Hampton Roads to Puerto Rico points in sailing vessels that are ordinarily in the coastwise trade. Less is heard of coal freights across the Atlantic since the new aspect of things in the North Sea.

Anthracite—Spot demand is almost nil in this territory. Dealers are more concerned with working down their stocks so that too much will not be carried over into April. Salesmen are already busy receiving orders for spring shipment and from present appearances the demand then will be only a little less than normal. Stocks are so light along the Maine coast that should there be a cold March there will be a good deal of eagerness for early April shipments.

Current quotations on bituminous at wholesale are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	\$0.90@1.45	\$1.15@1.60	\$1.67@1.77	
Philadelphia*	2.15@2.70	2.40@2.85	2.92@3.02	
New York*	2.45@3.00	2.70@3.15	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				\$2.70@2.80
Boston†				3.75@3.90
Providence†				3.65@3.80

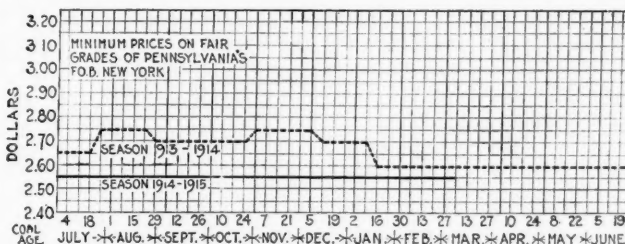
*F.o.b.

†On cars.

NEW YORK

Prompt business at a standstill. Interest centering on contracts on which competition is very keen. Anthracite production still further curtailed. April prices generally prevail.

Bituminous—The entire interest of the bituminous trade is now concentrated on new contracts. There is practically no prompt business of any kind in sight. In addition to this, stocks are relatively large, and some demurrage coal is still reported. Requisitions from the railroads continue light,



some new reductions being reported during the current week. With the exception of isolated plants working extra time on war orders, which is resulting either directly or indirectly in requisitions for additional tonnages, the situation has seldom ever been so flat. Mine operations are still heavily curtailed,

particularly on the off-qualities, the demand for which is especially light. Bunkering trade is only fair; the declaration of the war zone in the North Sea is not apparently affecting the off-shore trade, the difficulty still hinging on the shortage of vessel tonnage.

On new contracts the situation is still uncertain. What business has so far been closed has been on the same basis as last year, with possibly a few exceptions where concessions have been forced. But competition for business is extraordinarily keen this year, and conservative observers are convinced that some shading of old figures will ultimately prove necessary.

The prompt market is not changed from past quotations extending over several months which we continue as follows: West Virginia steam, \$2.35@2.55; fair grades, Pennsylvania, \$2.55@2.65; good grades of Pennsylvania, \$2.70@2.80; best Miller Pennsylvania, \$3.10@3.15; Georges Creek, \$3.15@3.25.

Anthracite—With the individuals offering coal clear down to the April circular, and apparently having plentiful supplies, the large companies adhering rigidly to the winter price schedule, are harkening to find an outlet for their production, even under the heavily restricted operations now in effect. A feature of the curtailment propaganda during the past week was the unexpected announcement of a full week's suspension by the Lehigh Valley; this company has been unusually successful in moving its product up to the present time, and the necessity for such a drastic restriction is significant of the trend of conditions.

The dealers are making every effort to clean up their stocks in order to avoid carrying over any high-price coal after the spring discount goes into effect. It can scarcely be said that there is a shortage on any sizes with the possible exception of buckwheat and broken coal; the intermittent operations at the collieries have so disrupted the customary routine of business that the output of these sizes has at times been temporarily short, though not to such an extent as to cause any anxiety. The large companies will no doubt begin the new coal year with exceptionally heavy stocks on hand. Further evidence of the adverse conditions prevailing in the trade is seen in the unusually large volume of coal loaded on Lake vessels.

The market is now quotable on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken.....	\$5.10	\$4.60@5.10	\$5.05	\$4.55@5.05
Egg.....	5.35	4.85@5.35	5.30	4.80@5.30
Stove.....	5.35	4.85@5.35	5.30	4.80@5.30
Chestnut.....	5.60	5.10@5.60	5.55	5.05@5.55
Pea.....	3.55	3.40@3.55	3.50	3.30@3.50
Buckwheat.....	2.80	2.60@2.80	2.50@2.75	2.35@2.75
Rice.....	2.30	2.20@2.30	2.00@2.25	1.95@2.25
Barley.....	1.80	1.70@1.80	1.75	1.30@1.75

BUFFALO

Operators pushing hard for business, which is having an adverse effect. Indications point to a dull market for some time. Independents quoting the April circular on anthracite and the coal year is about concluded.

Bituminous—There is a steady, but small trade, with sellers pushing hard for business which is hurting the market. They are urging all the coal on customers that they can and with the spring contracting season now at hand, this is having a decidedly adverse effect.

Slack is weak again but with the approach of the Lake season, all bituminous, especially slack, should be improving. From reports made at Upper-Lake ports it does not appear that there is going to be any help to the Lower-Lake trade this spring from that direction. Indications now are that the trade is bound to be dull for an indefinite time and it will take a large increase of tonnage to improve it very materially.

Some shippers found their closing February trade considerably better than it had been for some time and look for a further increase during the current month, while others will not admit that the improvement is worth mentioning and it is clear in any event that a large increase of tonnage will be necessary to put bituminous trade on a profitable basis. There is no change from the bottom quotations and Pittsburgh lump is \$2.80, three quarter, \$2.70; mine-run, \$2.55 and slack, \$2.15, with Allegheny Valley sizes about 25c. lower. All slack sells about on a par.

Anthracite—The trade for the coal year is about at an end. The late cold weather has added a car order here and there, but March is always quiet and a reduction is expected toward the close of the month. It appears that there has been rather too much coal sold in many districts and this will accentuate the general slowing down. The independent mines and jobbers are freely offering March deliveries at April prices but they are apparently not getting much tonnage, even at this cut. The large companies have sold a normal amount and will not push for trade at present.

There is some stocking of anthracite, besides the loading into Lake vessels. There is no surplus of egg in this market; all the loading and stocking have been confined to the smaller sizes, and this should be favorable to a brisk spring trade westward. At present there is about 175,000 tons afloat in the harbor for spring delivery.

PHILADELPHIA

Anthracite buyers show a marked indifference. Retailers' stocks sufficient for present requirements. Offerings at April circular numerous. Bituminous still characterized by weakness, and contracts on new business proceeding slowly.

Anthracite—The absence of any kind of weather conducive to the consumption of coal has almost brought the market to a standstill. The large companies maintaining the full circular prices are finding themselves hard pushed to dispose of their output, even on curtailed operations. During March a year ago, a succession of snow storms, coupled with low temperatures, injected considerable activity into a period which as a rule is dull, but the prospects for such a condition this year are growing more remote daily. The dealers are well intrenched in the matter of supplies, and have no difficulty in filling any gaps in their stocks at less than circular.

At the present time, more attention is being devoted to the conditions that are likely to prevail during the new coal season. The output this season has been more than the market will absorb, and many of the large companies will go into the new coal year with stocks far in excess of what is usually the case. The current output of pea, usually far from sufficient to supply the winter demand, has this year proved adequate, and accumulated stocks are likely to be carried over. The falling off in the demand for chestnut, and the increase in the call for stove are also likely to bring about the introduction of some policy to equalize the demand for these two sizes.

Outside of broken coal, for which there is an active demand at present, there seems to be little or no specific call. The fact that all sizes have been offered at substantial concessions down to the April circular or less to dispose of coal nearing the demurrage limit, makes the buyer very uncertain. Tidewater business to New England has been reduced to a minimum; it is understood that the terminal points are crowded with coal, and that substantial demurrage bills are likely to be incurred.

Prices at Tidewater rule about as follows:

	Circular	Individuals
Broken.....	\$4.75	\$4.50
Egg.....	5.00	4.80@4.90
Stove.....	5.00	4.90@5.00
Chestnut.....	5.25	4.90@5.00

Bituminous—There seems to be nothing in the bituminous market at the present time that would indicate an upward trend, either in prices or demand. Contracting proceeds slowly, possible purchasers apparently preferring to buy on the market for their current requirements, rather than enter into agreements which invariably call for higher quotations than spot offerings.

HAMPTON ROADS

Movement for week shows up well. Demand seems to be increasing with prices stationary.

Dumpings over the Tidewater piers for the week have shown up well. There have been heavy coastwise shipments to New England ports and a fair number of export cargoes. In addition to this the government has taken about 8000 tons for San Francisco, this cargo having been shipped by the str. "Cacique."

The demand for New River and Pocahontas run-of-mine and prepared sizes has improved somewhat, and there has also been a little demand for high volatile coals. Prices remain stationary. Present indications are that the February dumpings will show a decided increase over January figures. Export cargoes for the week have gone to Manzanilla, Buenos Aires, Genoa, Canal Zone, Pernambuco, Havana, Santiago, and San Juan, Porto Rico. Sailing vessels are still being employed in the export trade.

BALTIMORE

Contracting period engrosses attention of the trade. Export shipments holding up fair. Anthracite stimulated slightly by colder weather, but no branch of business is very brisk.

Were it not for the activity on new contracts, business would be unusually dull. As it is many coal men report more than the usual difficulties in placing their coal to advantage, and the current month will probably see many more consumers trying out fuels to secure bargains, than for a number of years past. Shipments of trial lots go to make up a large part of the tonnage now moving outside of coal intended for export, which remains quite active from this port. Reports from West Virginia, western Maryland and Penn

sylvania show much activity in developments for larger tonnages. The colder weather has helped anthracite sales in small way; there is nothing doing in larger business except negotiations along contract lines. No branch of the trade is brisk just now. Spot sales have been almost wiped out for soft coals, and the few sales made are about on a par with the prices for the past two or three weeks.

Exporting business holds up well, a number of charters for March loading having been announced. January of this year saw a movement of 89,779 tons, and February of 79,029 tons, the total movement for the first two months of 1915 being 47,262 tons in excess of the same periods of 1914. A maintenance of this average would give a yearly shipment of 1,012,848 tons, a considerable gain over the total figures of 1914.

OCEAN CHARTERS

Coal charters have been reported by the "Journal of Commerce" as follows:

Vessel	Nationality	From	To	Tons	Rate
Willesden	British	Baltimore	River Plate	3141	
Franklyn	British	Norfolk	West Coast		
			Italy	3161	
Banan	Norwegian	Baltimore	Guantanamo	948	
Nellie W. Craig		Norfolk	Bermuda	488	\$2.25
Van Allens Boughton		Baltimore	Boston	1909	
Petra	Norwegian	Baltimore	Puerto		
			Barrios	1292	
Edgar W. Murdock		Norfolk	Buenos Ayres	1215	
Australia (ship)	Italian	Philadelphia	Genoa	1442	
Gladys		Newport News	Porto Rico	645	
J. Edward Drake		Philadelphia	Galveston	789	\$1.87
Alderney	Norwegian	Philadelphia	Havana	1970	

Note—Steamers are indicated by **bold face type**, all others being schooners.

OCEAN FREIGHTS

Prompt steamers difficult to obtain and rates continue to advance.

The freight market again advanced during the past week, principally owing to the increased demand for steamers for grain cargoes. Prompt boats are very scarce and difficult to obtain. Since our last report only a few steamers have been chartered for export coal.

Rates quoted below, under present conditions, are bound to be more or less uncertain.

To	Rate	To	Rate
Havana.....	\$3.00	Guantanamo.....	\$3.75
Cardenas or Sagua.....	3.75	Demerara.....	5.50@6.00
Cienfuegos.....	3.50	Bermuda.....	3.75@4.25
Port of Spain, Trinidad.....	3.50	Vera Cruz.....	3.50
St. Lucia.....	3.50	Tampico.....	3.50
St. Thomas.....	3.50	Rio.....	10.20
Barbados.....	3.50	Montevideo, Buenos	
Kingston.....	3.50@4.00	Aires or La Plata.....	9.60
Curacao.....	3.25	Mediterranean.....	11.40
Santiago.....	3.75	Valparaiso.....	8.40

Note—Rates noted in **bold face type** are only approximate.

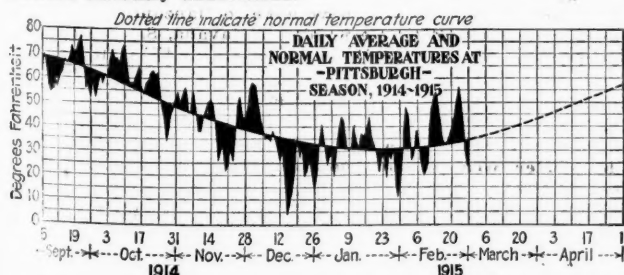
W. W. Battie & Co.'s Coal Trade Freight Report.

OHIO VALLEY

PITTSBURGH

Trade more depressed as season progresses without bringing any improvement. Asking prices continue almost nominal.

As the new month of March appears the coal trade is brought to a stronger realization of how poor the market situation is. The backbone of winter has certainly been broken, and without there having been even a single fortnight in which the domestic demand could be considered even passably good. It is now barely a month to Apr. 1, the conventional date for the closing of annual contracts, with practically nothing done in this direction and scarcely any negotiations seriously undertaken.



It is only six or seven weeks to the physical opening of Lake navigation, but the actual opening, as to the moving of any noteworthy tonnage of either ore or coal, appears to be in the dim and distant future. As to contracting for Lake coal there has been scarcely any as yet, and the large Lake shippers are showing no interest. Apparently they will be

able to move nearly all the coal for which they can now see a demand without making any season contracts, having fairly large tonnages from affiliated mining interests or from long-term annual contracts. The only Lake coal tonnage noted in these reports as closed in the past few weeks was a contract extending over a period of years.

The mental attitude in the trade is one of greater depression than a few weeks ago, though the actual market situation is unchanged. Domestic demand is moderate. Manufacturing demand makes a good comparison with the extremely poor conditions of last December, but has shown no improvement in the past two or three weeks, and the same is to be said of railroad demand. As for a long time past, quotations are almost invariably cut when anything like a good order appears. We continue to quote prices that are regarded as nominally representing the market, though they represent the basis from which departures are made, rather than the basis upon which any considerable tonnage is sold: Slack, 90c.@\$1; nut and slack, \$1.05; nut, \$1.10; mine-run, \$1.15; ¾-in., \$1.25; 1¼-in., \$1.35, per net ton at mine, Pittsburgh district.

COLUMBUS

The continued warm weather has weakened the trade still further. Production is at a low ebb. Outlook on new contracts generally adverse.

General weakness is still the chief characteristic of the local trade. The recent high temperatures have caused a still further falling off in domestic demand, which has really been the backbone of the trade. Dealers are not inclined to buy under present conditions and are devoting their energies to cleaning up their present stocks. Very few orders have been placed and cancellations are still one of the striking features. Little is now expected of the trade here until the stocking-up period arrives.

As a result of the decreased domestic demand, production in Ohio fields has been still farther curtailed. Reports from the Hocking Valley show that the output is only 25% of normal; the same figures are also reported from Jackson, Crooksville and Cambridge. Massillon is producing about 35% and Pomeroy Bend, 50% of the average. Many of the mines have been closed down indefinitely and others have been operated only one or two days weekly.

Prices are somewhat weak at the same levels which have prevailed for some time. Rescreened lump is selling in small quantities but other domestic grades are slow. Pocahontas is still quite popular. Steam business is heavy in every direction and sales agents have considerable difficulty in renewing contracts. Many of the steam users have been content to buy their supply on the open market. It is feared that when contracts are renewed it will be at some sacrifice.

Little is doing so far in the Lake trade; some coal has been loaded for shipment to the Northwest, but it is only a small amount. Just how active the Lake business will be is a matter of conjecture so far.

Prices in the Ohio fields are:

	Hocking Valley	Pomeroy	Kanawha
Rescreened lump.....	\$1.45	\$1.50	.....
Inch and a quarter.....	1.30	1.35	\$1.30
Three-quarter inch.....	1.25	1.30	1.25
Nut.....	1.15	1.25	1.15
Mine-run.....	1.05	1.10	1.05
Nut, pea and slack.....	0.60	0.65	0.55
Coarse slack.....	0.50	0.55	0.45

CINCINNATI

Cold weather causes a local flurry in domestic, but the trade continues at a standstill. Market virtually on a spring basis. New contracts the only business in sight.

The trade has now settled down into the usual between-seasons attitude, operators being convinced that it will be impossible to add anything further to the winter's business; this seems to have had the effect of putting an end to heavy price concessions. The agencies also have their eyes on the coming spring business and are not inclined to jeopardize this with offers at ruinous prices. There also seems to be little distress coal offering on this market, probably for the same reason. Some consignment coal is reported at other points, but shipments to Cincinnati on that basis appear to have been discontinued as useless. Prospects for spring business are considered favorable, especially by Kentucky and West Virginia interests.

LOUISVILLE

Operations being curtailed and prices low.

The Kentucky market continues unsatisfactory, with suspension of operations more or less general in the Western field and imminent in the Eastern. Continuation of the warm weather and the most limited demand for any of the domestic sizes have caused a stiffening in the nut and slack market, due to scarcity of that grade rather than to increase in the demand; some of the better grades are commanding from 65 to 75c. Other coals are unchanged in price.

BIRMINGHAM

Coal market very quiet and mine operations heavily restricted. Large sales of pig iron.

The past 10 days has brought little change in either lump or steam coal. There is practically no demand outside of regular yearly contracts. The mines are running on an average of two to three days per week. Blacksmith coal is about normal. There have been several large sales of pig iron recently, though the prices are far below normal.

COKE

CONNELLSVILLE

Coke market continues stagnant marketwise, with heavier production and shipments by the producer-consumer class.

The coke market continues without important incidents. There are no furnaces going into blast that would need to purchase coke, such increases in furnace operations as have occurred, or are in prospect, being by those who have their own production or closed contracts late in the old year. We quote: Prompt furnace, \$1.50@1.55; contract furnace, to July 1, \$1.60; to Dec. 31, nominal, \$1.75; prompt foundry, \$2@2.25; contract foundry, nominal, \$2.20@2.30, per net ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Feb. 20 at 271,090 tons, an increase of 20,235 tons, and shipments at 269,888 tons, an increase of 20,345 tons.

Buffalo—There is nothing to indicate a stir in the coke market. A moderate amount is selling and that is likely to be the extent of the trade for an indefinite time. Coke prices remain on the former basis of \$4.25 for best 72-hr. Connellsville foundry and \$3.30 for stock coke.

Chicago—Furnace and foundry coke is listless, with prices remaining about the same as last week. Domestic sizes are quiet, with no better absorption. Quotations are as follows: Byproduct, \$4.75@4.90; Connellsville, \$4.60@4.80; Wise County 72-hr. (select), \$4.50@4.75; gas coke, \$4.10@4.25; furnace, \$4.50@4.65.

THE STEEL INDUSTRY

February record shows an increase but it is questionable whether it can be maintained. Railroad buying fair.

The February record of larger specifications by buyers and of broadening operations of mills has created a good feeling in the steel trade, but with it a question is raised as to the maintenance in March of the recent rate of new bookings. The advance of heavy steel products to 1.15c., Pittsburgh, put into effect Mar. 1, finds many consumers covered for this month at 1.10c., while not a few have contracts at 1.10c. that will carry them one or two months into the second quarter. It is not likely, therefore, that bars, plates and structural steel will be active enough to really try out the new prices.

The month starts with steel ingot production at 60 to 65% of capacity, the latter being the Steel Corporation's rate. Due to the heavier shipments last month—and shipments are the real barometer—the Steel Corporation's unfilled orders at the end of February, while more than at the end of January, showed a smaller increase for the second month than for the first.

A number of independent producers have had the same experience as the Steel Corporation—larger shipments in February than in January, but with a tendency to quietness showing itself as the month ended.

While disappointing as to cars and locomotives, there is no great complaint of railroad buying of rails, which for the first two months of the year has exceeded 500,000 tons.—"The Iron Age."

MIDDLE WESTERN

CHICAGO

General weakness prevails. No improvement in domestic coals. Smokeless fuels still inactive and depressed. Some hardening in steam coals.

Coal buying drags along in a discouraging way, and demand for domestic sizes is at a standstill. All efforts to stimulate sales have proved fruitless, and spring-like weather has played havoc with the situation. The Indiana and Illinois mines are operating at three days per week, and some only two days. Tracks at the Indiana mines are congested with coarse coal, and in southern Illinois there is a considerable

tonnage of the finer sizes on consignment. Operators see no improvement in sight, even though a cold snap should arrive, and it is felt that the winter is mostly over.

More stability is evident in screenings, due primarily to curtailment of production. Free screenings are very spotty; in some districts none are available, and in others they are plentiful. Prices for domestic sizes are at the bottom, and retailers report a slowing up in the demand from consumers.

The movement of coal from the Indiana mines during February will probably fall 25% below that for the same month last year. A number of mines have suspended with the expressed intention of remaining idle for an indefinite period. Prices on domestic sizes range as low as \$1.30 per ton, and there hardly seems to be room for further reductions. Mine-run is selling around \$1 per ton.

Circular prices on Franklin and Williamson County coals are being maintained, but shipments are scarce. Screenings have improved. Operating time is averaging about two days per week.

In the Springfield District the working time averages about three days per week. The domestic demand still continues weak and the railroad demand has been reduced.

In Hocking, 50 cars of lump on demurrage were offered at any price to effect disposition. This coal has not been absorbed, and the major portion of it will be sold for demurrage and carrying charges.

Smokeless coals show no improvement, and some producers are accepting any reasonable offer for mine-run. The situation is extremely unfavorable.

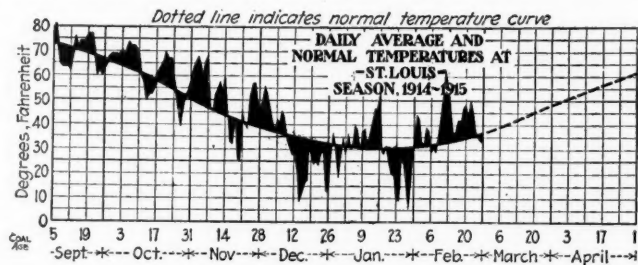
Anthracite is flat, due to the near approach of the April prices. Some of the independents have quoted 40c. per ton under list in a futile effort to force the market.

Prevailing quotations are as follows:

	Williamson and Franklin Cos.	Springfield	Sullivan	Clinton	Carterville
Lump.....	\$1.40@1.50	\$1.30@1.40		\$1.30@1.40	\$1.40@1.65
4-in. lump.....			\$1.40@1.75		
Steam lump.....			1.25@1.35	1.25@1.35	
2½-in. lump.....			1.35@1.50		
1½-in. lump.....			1.25@1.35	1.25@1.35	
Mine-run.....	1.10@1.25	1.00@1.05	1.00@1.10	0.95@1.10	
Egg.....	1.35@1.50	1.25@1.40	1.20@1.30	1.15@1.25	
No.1 washed.....					1.50@1.65
No.2 washed.....					1.40@1.50
6x3-in. egg.....					1.50@1.65
Nut.....		1.25		1.20@1.25	
No. 1 nut.....	1.35@1.50				
No. 2 nut.....	1.25@1.35				
Screenings.....	0.75@0.85	0.65@0.70	0.65@0.75	0.65@0.75	0.75@0.80

	Saline Co.	E. Kentucky	N. Riv. & Pocah.	Somerset	Hocking
Lump.....	\$1.35@1.40	\$1.00@1.25	\$1.50@2.00	\$1.50@1.90	
1½-in. lump.....		1.00@1.25			\$0.90@1.25
Lump & egg.....					
Mine-run.....	1.10@1.15		1.25@1.40	1.00@1.15	1.00@1.15
Egg.....		0.90@1.00	1.50@2.00	1.40@1.75	
No. 1 nut.....	1.30@1.40		1.50@1.75		
No. 2 nut.....	1.25@1.40				
Screenings.....	0.65@0.75				

Knox and Greene County 5-in. lump, \$1.35@1.50; 3-in. lump, \$1.25@1.30; 5-in. lump, \$1.20@1.30; 3-in. egg, \$1.20@1.25; mine-run, \$1@1.10; screenings, 65@75c.



ST. LOUIS

Screenings market temporarily stimulated. February an unsatisfactory month for the coal trade.

Toward the close of last week, the screenings market tightened up, but not to the extent that was anticipated. Williamson and Franklin County 2-in. screenings went to 50c. and 85c. and Standard 2-in. advanced to 65c. With the beginning of March, however, there is a better demand for domestic sizes, both locally and from the country section, and this has eased the screenings market some. But unless there is some cold weather to follow, this domestic demand will be light and only temporary, which will put steam sizes back into their own.

February was the mildest in the history of the local coal trade. Summer prices prevailed on all coals from the Williamson-Franklin County field, both raw and washed, as well as from the Standard district. Pennsylvania anthracite is at a standstill, and practically no smokeless is moving in at all.

KANSAS CITY

Weather continues favorable but mines are slowing up with the approach of spring. Prices lower.

The slow season for the operators has arrived, although winter still prevails. A number of mines were reported closed during the week and some others are operating only part time. This is mainly the result of the usual spring slowing down, but is partly caused by an over supply of coal on the cars in Kansas City. Nearly all companies have been obliged to pay demurrage, and in the anxiety to move their coal, much cutting of prices occurred last week. Cherokee lump fell off 25c. to \$2 and nut dropped about 10c. to \$1.85 or \$1.90. Both Missouri and Kansas steam coal sells now at \$1.25, but the price went as low as \$1.10 early in the week.

PORTLAND, ORE.

Volume of business for the season well up to the average. Summer discount on Wyoming and Utah coals.

The fuel business has held up splendidly during February, contrary to expectations of dealers and the final analysis for the season will probably show that business was up to the average. The Utah and Wyoming mines took off 50c. per ton on Feb. 1 but the retail prices here have not been affected yet; the reduction is that usually announced for May 1 when summer prices go into effect. Washington mines usually maintain the same prices winter and summer. There is said to be little likelihood of any Atlantic Coast coal coming into this field by way of the Panama Canal, owing to the scarcity of attractive carriers.

PRODUCTION AND TRANSPORTATION STATISTICS

PENNSYLVANIA RAILROAD

The following is a statement of shipments over the P. R. R. Co.'s lines east of Pittsburgh and Erie for January of the current year and the 12 months of 1913 and 1914, in short tons:

	January		Twelve Months	
	1915	1914	1914	1913
Anthracite.....	894,529	915,027	11,201,150	10,711,335
Bituminous.....	3,571,345	4,117,514	47,769,227	51,526,267
Coke.....	685,546	853,412	9,548,354	13,892,825
Total.....	5,151,420	5,885,953	68,518,731	76,330,427

BALTIMORE & OHIO

The following is a statement of coal and coke tonnage moved over this system and affiliated lines during November and December of 1914 and January of the current year:

	November		December		January	
	1914	1913	1914	1913	1915	1914
Coal.....	2,324,271	2,939,975	2,227,899	3,005,914	2,293,406	2,917,834
Coke.....	185,466	343,387	232,594	269,998	221,395	274,955
Total....	2,509,737	3,283,362	2,460,493	3,275,912	2,514,801	3,192,789

COAL FREIGHT DECISIONS

The Illinois Coal Cases—I. C. C. Nos. 5346, 5668, 5698, 5698 Sub-No. 1 and Investigation and Suspension Docket No 237.

1. Upon complaint and intervening petitions alleging (1) that the so-called Springfield group of Illinois is unduly large and that the application of the same rate from all coal mines in this group to destinations in the Northwest unjustly discriminates against the mine operators in the northern part of the group by depriving them of the advantage of their location nearer to the common markets; and (2) that the present spread of 70c. in the rates from southern Illinois over those from northern Illinois to the same destinations is not sufficient and should be increased to \$1; it is **Held**:

That no basis has been shown of record for dividing the present Springfield group or for increasing the present rate differential against the southern Illinois mines. Nor does the record justify a modification in any of the other rate groups involved in the proceeding.

2. No unjust discrimination against St. Louis or other violation of the act to regulate commerce shown of record in the present relation of rates on coal from Illinois mines moving to that point as compared with rates on coal from the same mines to East St. Louis.

3. The proposed increase of 5½c. per ton in the rates on coal to St. Louis from Illinois mines found to have been justified.

Investigation and Suspension Docket No. 448—Rates on coke from Chicago and Peoria, Ill., to St. Paul, Duluth, Minn. and other points.

1. Proposed increased rates on coke in carloads from St. Louis, Mo., Chicago, Waukegan, and Peoria, Ill., Milwaukee and other points in Wisconsin, and Menominee, Mich., to points in Minnesota other than Duluth and in Wisconsin, Iowa, and South Dakota, justified.

2. Proposed increased rates on the same commodity from the same points of origin to Duluth, Minn., held unreasonable to the extent that they exceed \$2.15 per ton.

I. C. C. No. 6712—Public Utilities Commission of Idaho vs. Oregon Short Line R.R.

Rates for the transportation of bituminous coal in carloads from Kemmerer and Rock Springs, Wyo., to points in southern Idaho not shown to be unreasonable. Complaint dismissed.

FOREIGN MARKETS

GREAT BRITAIN

Demand in excess of supply. Prices high and sellers cautious about commitments.

The coal industry is still suffering a great deal from the abnormal difficulties which have come upon it as a result of the war. There can be no doubt that the demand for practically every class of coal remains in excess of the available supply, and in the circumstances prices have an upward tendency all around. Even in the North East Coast shipping centers, and in South Wales, where scarcity and irregular arrivals of tonnage have often combined to depress the export market, the trade tide seems to have turned definitely at last, and, despite the continued high level of freight rates, business is decidedly better.—"The Iron and Coal Trades Review."

Feb. 10—For all classes of coal the market remains in an extremely strong condition. Supplies are unobtainable for this month while the various collieries are heavily booked for March. Quotations are approximately as follows:

Best Welsh steam.....	\$5.40@5.52	Best Monmouthshire.....	\$4.92@5.04
Best seconds.....	4.92@5.28	Seconds.....	4.80@4.92
Seconds.....	5.04@5.16	Best Cardiff smalls.....	4.14@4.26
Best dry coals.....	4.80@5.04	Cargo smalls.....	3.60@3.84

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport both net, exclusive of wharfage.

Freights—Chartering is fairly active but business is below normal owing to the difficulty of arranging loading turns. Rates are approximately as follows:

Gibraltar.....	\$5.04	Naples.....	\$7.92	Las Palmas.....	\$4.80
Malta.....	5.70	Venice, Ancona.....	10.20	St. Vincent.....	5.16
Marseilles.....	5.70	Alexandria.....	6.96	Rio Janeiro.....	6.48
Algiers.....	5.40	Port Said.....	6.96	Monte Video.....	5.64
Genoa.....	7.92			River Plate.....	5.88

Note—These quotations are based on an exchange rate of one shilling equals 24 cents.

Exports—British exports for January and the past three years were as follows:

To	January			Year		
	1912	1913	1914	1912	1913	1914
Russia.....	226,040	239,004	.....	4,046,644	5,998,434	3,087,805
Sweden.....	305,905	286,488	262,936	4,115,551	4,563,076	4,250,255
Norway.....	215,012	217,682	210,335	2,201,305	2,298,345	2,462,200
Denmark.....	259,464	246,017	208,784	2,780,957	3,034,240	3,059,162
Germany.....	668,466	553,433	.....	8,391,864	8,952,328	5,256,765
Netherlands.....	202,122	127,412	131,378	2,096,494	2,018,401	1,722,215
Belgium.....	197,220	178,849	.....	1,546,768	2,031,077	1,168,554
France.....	1,150,552	1,235,642	1,383,961	10,190,948	12,775,909	12,330,545
Portugal.....	142,590	130,778	69,934	1,255,417	1,356,081	1,169,625
Spain.....	361,473	345,621	159,350	3,441,523	3,648,760	2,940,148
Italy.....	821,387	790,605	469,885	9,180,508	9,647,161	8,625,254
Aus. Hung.....	137,555	72,842	.....	728,941	1,056,634	564,362
Greece.....	40,831	8,334	23,588	610,383	727,890	578,757
Romania.....	.....	.....	.....	195,600	251,925	218,218
Turkey.....	16,772	40,219	.....	348,469	369,789	429,506
Egypt.....	130,731	131,274	99,227	2,925,825	3,162,477	2,633,581
Algeria.....	3,827	20,911	9,437	1,054,786	1,281,664	910,211
Portugal, Casco.....	66,004	35,398	5,224	281,869	233,015	184,686
Chile.....	139,911	118,531	66,484	551,980	588,526	377,482
Brazil.....	78,351	56,523	49,692	1,625,780	1,886,871	1,176,780
Uruguay.....	319,409	354,770	178,606	870,313	723,936	550,876
Argentina.....	13,273	12,031	7,340	3,365,099	3,693,572	2,883,064
Channel Is.....	36,794	32,481	30,269	176,996	167,862	162,066
Gibraltar.....	66,616	35,686	11,316	343,439	354,702	309,650
Malta.....	314,420	315,182	149,665	474,784	700,111	338,673
Aden.....	11,153	12,079	10,254	191,307	181,204	159,821
India.....	4,773	1,837	8,925	134,514	179,192	158,261
Ceylon.....	24,376	38,539	6,604	242,111	239,657	250,173
Miscellaneous.....	95,051	110,311	59,775	1,071,520	1,277,270	1,101,185
Coke.....	107,095	124,256	92,597	1,010,650	1,235,141	1,182,248
Briquettes.....	196,739	169,945	64,038	1,580,803	2,053,187	1,607,757
Total.....	6,374,152	6,088,971	3,769,598	67,035,848	76,688,446	61,830,485
Punker.....	1,757,679	1,731,012	1,377,081	18,291,370	21,631,550	18,535,579

¹ Includes Azores and Madeira. ² Including Anglo-Egyptian Sudan. ³ And dependencies. ⁴ And Canaries. ⁵ West Africa.

Coal Contracts Pending

It has been found impossible to eradicate all inaccuracies from this department; since its inception 2.5 per cent. of the items listed have been reported as incorrect, in spite of the fact that we are paying a higher average scale of remuneration for this matter than has ever been paid by this, or any other coal journal. In the collection of this information the customary sources of inquiry, such as clipping bureaus, press reports, etc. were rejected because of their unreliability. Only information obtained directly from the source of the proposed business, or a seemingly reliable connection, is accepted, and much of this is drawn through our affiliations with other leading technical journals. In justice to ourselves and our readers, we believe this brief statement to be warranted. It is only through the close cooperation of all concerned that this department can attain a lasting success and be of real benefit to the coal trade. We will, therefore, appreciate any and all information relative to inaccuracies of contracts listed below.

No. 88—Vincennes, Ind.—The City Electric Lighting Co., at this place, contracts for about 5000 tons of mine-run coal and screenings some time during the current month. The approximate cost is \$1.45 for mine-run and \$1.15 for screenings and the business is done on a competitive basis (p. 318). Address Mgr., A. J. Hetz, The City Electric Lighting Co., Vincennes, Indiana.

No. 93—Jersey City, N. J.—The lowest bid submitted to the Hudson County Boulevard Commissioners for furnishing and delivering 2500 gross tons of best quality pea coal (p. 356) was from Behrens Bros., Paterson Plankroad, Secaucus, N. J. Address Clk. of the Bd. John C. Sweney, Boulevard Comrs., County Courthouse, Jersey City, N. J.

No. 131—Rochester, N. Y.—The Board of Education at this place will be in the market during the current month for about 6000 tons of anthracite and 6000 tons of semi-bituminous coal (p. 357). Address Secy. J. S. Mullen, Municipal Bldg., Rochester, N. Y.

No. 135—Baltimore, Md.—Henry Sonneborn & Co., at this place, purchase an annual supply of from 3500 to 4000 tons of standard mine-run soft coal (p. 357). In general the contract is let during March. Address Pur. Agt. A. Mainzer, Pratt and Paca St., Baltimore, Md.

No. 138—Baltimore, Md.—The Calvert Bldg. contracts for an annual supply of 5000 tons of standard mine-run soft coal, usually during the current month (p. 358). Address Pur. Agt. Franklin G. Lauderman, Calvert Bldg., Baltimore, Md.

No. 157—Detroit, Mich.—Sealed proposals will be received up to 2 p.m., Mar. 9, by the Board of Water Commissioners for furnishing 25,000 tons of bituminous mine-run coal (p. 398). The Board reserves the right to order, before Aug. 15, 2000 additional tons at the contract price. Each bid must be accompanied by a certified check for \$500. Address Secy. H. A. Gilmartin, Board of Water Commissioners, Detroit, Mich.

No. 164—Detroit, Mich.—Sealed proposals will be received until 2 p.m., Mar. 9, by the Board of Water Commissioners for furnishing about 700 tons of bituminous and 40 tons of anthracite coal to be delivered at the storage yard, emergency station and office of the Board of Water Commissioners (p. 399). Address Secy. H. A. Gilmartin, Board of Water Commissioners, Detroit, Mich.

No. 170—Pontiac, Mich.—Bids will be received until 1:30 p.m., Mar. 11, for furnishing the Pontiac State Hospital with a supply of coal for one year commencing May 1, 1915 (p. 399). The approximate quantities are 7500 tons of free-burning three-quarter lump bituminous coal and about 500 tons of anthracite coal (250 tons grate, 250 tons stove, and 30 tons chestnut). Prices must be f.o.b. hospital, and bidders should specify location of mine. Address Steward E. H. Halsey, Pontiac State Hospital, Pontiac, Mich.

No. 186—Natick, Mass.—The Natick Gas Light Co. at this place advises that it has discontinued the manufacture of gas and will not be in the market for 3000 tons of bituminous coal, as stated in a previous issue (p. 398). Address B. J. Bean, Natick Gas Light Co., Natick, Mass.

No. 188—Sturgeon Bay, Wis.—The local utility commission will be in the market for about 4000 tons of coal, contract for which will be made during either this month or next (p. 399). Youghiogheny three-quarter coal is ordinarily used, and the price is about \$3 per ton. Address Supt. James E. Johnson, Sturgeon Bay Utility Commission, Sturgeon Bay, Wis.

No. 191—Metropolis, Ill.—The local water and light department will be in the market during March or April for about 2700 tons of 2-in. screenings (p. 399). This business is usually closed at about \$1.60 per ton. Address Frederic N. Cover, C. E., City of Metropolis Water & Light Dept., Metropolis, Ill.

No. 214—Grand Junction, Colo.—The Grand Junction Electric, Gas & Mfg. Co. at this place will be in the market about Apr. 1 for approximately 7500 tons of bituminous coal, the present contract being closed at \$1.54 per ton. Address Gen. Mgr. E. A. Sunderlin, Grand Junction Electric, Gas & Mfg. Co., Grand Junction, Colo.

No. 215—Martins Ferry, Ohio.—The Municipal Electric Light & Power Plant will be in the market about Apr. 1 for from 3000 to 4000 tons of bituminous mine-run coal. The present contract was closed at \$1.45 to \$1.50 per ton. Address Supt. J. W. Tush, Municipal Electric Light & Power Plant, Martins Ferry, Ohio.

No. 216—Frederick, Md.—The Municipal Electric Light Plant at this place will be in the market about Apr. 1 for approximately 1100 tons of Big Vein Georges Creek coal. The present contract was closed at \$3.20 per ton, f.o.b. Frederick. Address Clk. Jacob H. Schmidt, The Municipal Electric Light Plant, Frederick, Md.

No. 217—Dixon, Ill.—The Illinois Northern Utilities Co. of this place will be in the market about Apr. 1 for 45,000 tons of screenings, mine-run, and egg coal. The approximate cost per ton is \$2.80 unloaded. Address F. M. Smith, Fuel Dept., Illinois Northern Utilities Co., Dixon, Ill.

No. 218—New Britain, Conn.—The Board of Education will be in the market during March or April for about 1500 tons of hard white ash or Old Company's Lehigh coal. Address L. H. Pierce, Finance Com., Board of Education, New Britain, Conn.

No. 219—Hillsdale, Mich.—The Board of Public Works will be in the market about Apr. 1 for 3500 tons of West Virginia mine-run coal, the present contract being closed at \$2.50 per ton. Address Contract Agt. J. C. Hanson, Municipal Electric Light & Water Plant, Hillsdale, Mich.

No. 220—Richmond, Va.—Bids will be received until 2 p.m., Apr. 14, for furnishing the U. S. Post Office 400 tons of bituminous coal. Address Custodian H. T. Thornton, U. S. Post Office, Richmond, Va.

No. 221—Columbus, Ohio.—Bids will be received until 2 p.m., Apr. 14, for furnishing the U. S. Post Office 700 tons of bituminous coal. Address Custodian S. A. Kinnear, U. S. Post Office, Columbus, Ohio.

No. 222—Bayonne, N. J.—Sealed proposals will be received by the Board of Education until 8 p.m., Mar. 18, for furnishing about 2500 tons of coal, the amount to be made up of 1500 tons, more or less, of egg, stove, or nut coal, and 1000 tons, more or less, of pea coal. Address Secy. W. J. Tomlin, Board of Education, Ave. C and 26th St., Bayonne, N. J.

No. 223—Independence, Iowa.—Bids will be received by the City Clerk until Mar. 8, for furnishing the coal supply for the city during the year ending Apr. 1, 1916. Prices should be submitted for No. 2 washed coal, f.o.b. Independence, giving the B.t.u. dry and wet basis. About 125 car loads of 80,000 lb. each are used per year. Address City Clk. Rufus Brewer, Independence, Iowa.

No. 224—New Albany, Ind.—Bids will be received by the Auditor, Floyd County, until 10 a.m., Mar. 4, for furnishing coal for the court house, poor asylum, and county jail during the fiscal year. Address Audr. Julian T. Miller, New Albany, Ind.

No. 225—Madison, Wis.—The Board of Education of this place will be in the market during April or May for about 500 tons of anthracite pea and Pocahontas coal. This contract is usually awarded to a local dealer, the award being made on a competitive basis. Address Chief Clk., Board of Education, Madison, Wis.

No. 226—Portland, Ore.—The Board of Education will be in the market during April for about 2000 tons of steam coal. The present contract was let at \$6 per ton. Address Chief Clerk, Board of Education, 401 Court House, Portland, Ore.

No. 227—Wabash, Ind.—The Wabash Water & Light Co. will be in the market about Apr. 1 for 7500 tons of southern Indiana No. 4 slack coal. The present contract price is \$1.70 per ton, delivered. Address Mgr. T. W. McNamee, Wabash Water & Light Co., Wabash, Ind.

No. 228—Cambridge, Mass.—The Board of Education will be in the market about Apr. 1 for 5000 tons of anthracite and

bituminous coal. The present contract was awarded at \$5.73 for anthracite and \$4.36 for bituminous. Address the School Committee, City Hall, Cambridge, Mass.

No. 229—Bennettsville, S. C.—The Bennettsville Electric & Water Plant will be in the market about Apr. 1 for 7500 tons of semibituminous coal, the present contract price being \$3.75 per ton. Address Mgr. E. C. Morrison, Bennettsville Electric & Water Plant, Bennettsville, S. C.

No. 230—Eldon, Iowa.—The City Electric Light & Water Works will be in the market about Apr. 1 for 1200 tons of 1½-in. screening, the present contract price being \$1.75 per ton in bin. Address Mgr. C. A. Flint, Municipal Electric Light & Power Plant, Eldon, Iowa.

No. 231—Easthampton, Mass.—The Easthampton Rubber Thread Co. will be in the market about Apr. 1 for 1500 tons of bituminous coal, delivery via N. Y., N. H. & H. R.R. Address Pur. Agt. W. L. Pitcher, Easthampton Rubber Thread Co., Easthampton, Mass.

No. 232—Middletown, Conn.—The Middletown Electric Light Co. will be in the market for 5000 tons of bituminous coal about Apr. 1, delivery via water. Address Pur. Agt. L. C. Whitney, Middletown Electric Light Co., Middletown, Conn.

No. 233—Fair Haven, Vt.—The United Shirt & Collar Co. will be in the market about Apr. 1 for 4000 tons of anthracite coal, delivery via D. & H. R.R. Address Pur. Agt. W. A. Pine, the United Shirt & Collar Co., Fair Haven, Vt.

No. 234—Middletown, Conn.—The Russell Mfg. Co. will be in the market about Apr. 1 for 3500 tons of bituminous coal, delivery via water and teams. Address Pur. Agt. L. deK. Hubbard, Russell Mfg. Co., Middletown, Conn.

No. 235—Springfield, Mass.—The United Electric Light Co. will be in the market for approximately 20,000 tons of bituminous coal about Apr. 1, delivery via N. Y., N. H. & H. R.R. Address Pur. Agt. W. L. Mulligan, United Electric Light Co., Springfield, Mass.

No. 236—New York, N. Y.—The International Paper Co. will be in the market about Apr. 1 for 200,000 tons of bituminous coal, deliveries at their various plants via water and rail. Address Pur. Agt. G. E. Smith, 30 Broad St., New York, N. Y.

No. 237—Northampton, Mass.—The Northampton Electric Lighting Co. will be in the market about Apr. 1 for 2500 tons of bituminous coal, delivery via N. Y., N. H. & H. R.R. Address Light, Heat & Power Corporation, Boston, Mass.

No. 238—Chicago, Ill.—The Grand Crossing Tack Co. will be in the market about Apr. 1 for a year's supply of Youghiogheny ¾-in. lump coal and Illinois or Indiana mine-run coal. This company consumes about 75 tons of Youghiogheny ¾-in. lump coal per week, and 160 tons of Illinois or Indiana mine-run coal per day. Address Grand Crossing Tack Co., 75th St. and Stoney Island Ave., Chicago, Ill.

No. 239—Hartford, Conn.—The Columbia & Electric Vehicle Co. will be in the market for 2500 tons of bituminous coal about Apr. 1, delivery via N. Y., N. H. & H. R.R. Address Columbia & Electric Vehicle Co., Hartford, Conn.

No. 240—Bellows Falls, Vt.—The Robertson Paper Co. will be in the market about Apr. 1 for 4000 tons of anthracite coal, deliveries via B. & M. R.R. and Putland R.R. Address Pur. Agt. F. H. Babbitt, Robertson Paper Co., Bellows Falls, Vt.

No. 241—Fall River, Mass.—The Stafford Mills will be in the market for about 11,000 tons of anthracite coal on Apr. 1, delivery by team. This supply is bought from local dealers. Address Pur. Agt. Samuel Wilkinson, Stafford Mills, Fall River, Mass.

No. 242—New York, N. Y.—The Rutland R.R. Co. will be in the market about Apr. 1 for 150,000 tons of bituminous coal, delivery all rail. Address Gen. Pur. Agt. F. H. Greene, Grand Central Station, New York.

No. 243—Manchester, Conn.—Case Bros. will be in the market about Apr. 1 for 2000 tons of bituminous coal, delivery via N. Y., N. H. & H. R.R. and teams. Address Case Bros., Manchester, Conn.

No. 244—Taunton, Mass.—The Elizabeth Poole Mills will be in the market about Apr. 1 for 1500 tons of anthracite and bituminous coal, deliveries by team. This supply is usually bought from local dealers. Address Henry Lovering, Elizabeth Poole Mills, Taunton, Mass.

No. 245—Southington, Conn.—The Peck, Stow & Wilcox Co., Southington, Plantsville, East Berlin and Elmwood, will be in the market about Apr. 1 for 10,000 tons of bituminous coal, delivery via N. Y., N. H. & H. R.R. Address Pur. Agt. W. H. Neal, Peck, Stow & Wilcox Co., Southington, Conn.

No. 246—Haverhill, Mass.—Lennox & Briggs will be in the market about Apr. 1 for 1800 tons of bituminous coal, deliveries via water and B. & M. R.R. Address George Lennox, Lennox & Briggs, Haverhill, Mass.

No. 247—Montpelier, Vt.—The Capital City Gas Co. will be in the market for 2000 tons of gas coal about Apr. 1, delivery via Central Vermont R.R. Address Capital City Gas Co., Montpelier, Vt.

No. 248—Mt. Tom Junction, Mass.—The Mt. Tom Sulphite Pulp Co. will be in the market for 11,000 tons of bituminous coal about Apr. 1, delivery via B. & M. R.R. Address Mt. Tom Sulphite Pulp Co., 50 State St., Boston, Mass.

No. 249—Middletown, Conn.—The Connecticut Hospital for the Insane will contract about Apr. 1 for 9600 tons of anthracite and bituminous coal, delivery via N. Y., N. H. & H. R.R. Address Superintendent, Connecticut Hospital for the Insane, Middletown, Conn.

No. 250—Waterbury, Conn.—The United Gas Improvement Co. will be in the market about Apr. 1 for 5000 tons of anthracite coal, delivery all rail via N. Y., N. H. & H. R.R. Address United Gas Improvement Co., Philadelphia, Penn.

No. 251—Bellows Falls, Vt.—The Rockingham Paper Co. will be in the market for 2000 tons of bituminous coal about Apr. 1, deliveries via D. & H. R.R. and N. Y. C. R.R. Address Pur. Agt. G. H. Babbitt, Rockingham Paper Co., Bellows Falls, Vt.

No. 252—Taunton, Mass.—The Taunton State Hospital will contract about Apr. 1 for 3000 tons of bituminous coal, delivery by team. Address Superintendent, Taunton State Hospital, Taunton, Mass.

No. 253—Rutland, Vt.—The Rutland R.R., Light & Power Co. will be in the market about Apr. 1 for 3000 tons of gas coal, deliveries via D. & H. R.R. and N. Y. C. R.R. Address the Rutland Ry., Light & Power Co., Rutland, Vt.

No. 254—Montville, Conn.—The C. M. Robertson Co. will be in the market about Apr. 1 for 3000 tons of bituminous coal, deliveries via D. & H. R.R. and N. Y. C. R.R. Address Pur. Agt. T. E. Robertson, C. M. Robertson Co., Montville, Conn.

No. 255—Taunton, Mass.—Reed & Barton will be in the market about Apr. 1 for 1500 to 2000 tons of anthracite and bituminous coal, deliveries by team. This supply is usually bought from local dealers. Address Pur. Agt. L. A. Hodges, Reed & Barton, Taunton, Mass.

No. 256—Ludlow, Vt.—The Black River Woolen Co. will be in the market about Apr. 1 for 1000 to 1500 tons of bituminous coal, delivery via Rutland R.R. Address Pur. Agt. Geo. P. Levey, Black River Woolen Co., Ludlow, Vt.

No. 257—New Haven, Conn.—The Department of Charities and Correction will contract about Apr. 1 for 1100 tons of bituminous and anthracite coal. This coal is purchased from local dealers, delivery by team. Address the Department of Charities and Correction, New Haven, Conn.

No. 258—Albany, N. Y.—Sealed proposals will be received until noon, Mar. 24, for supplying various state institutions with coal for one year, beginning Apr. 1, 1915. Address Agt. and Warden Thomas Mott Osborne, Sing Sing Prison, Ossining, N. Y.; Agt. and Warden Charles F. Rattigan, Auburn Prison, Auburn, N. Y.; Agt. and Warden William J. Homer, Great Meadow Prison, Comstock, N. Y.; Agt. and Warden John B. Trombly, Clinton Prison, Dannemora, N. Y.; Medical Supt. R. F. C. Kiehl, Matteawan State Hospital, Beacon, N. Y.; Medical Supt. Charles H. North, Dannemora State Hospital, Dannemora, N. Y.

No. 259—Fall River, Mass.—The Algonquin Printing Co. will be in the market about Apr. 1 for 12,000 tons of anthracite and bituminous coal, delivery by water. Address Pur. Agt. W. H. Jennings, Algonquin Printing Co., Fall River, Mass.

No. 260—Erie, Penn.—Sealed proposals will be received until Apr. 1 for furnishing a six months' supply of coal to the Soldiers' and Sailors' Home at Erie. Address Col. John P. Nicholson, Flanders Bldg., 15th and Walnut St., Philadelphia, Penn.

No. 261—Avon, Conn.—The Ensign Bickford Co. will be in the market about Apr. 1 for 2500 tons of bituminous coal, delivery via N. Y., N. H. & H. R.R. Address the Ensign Bickford Co., Avon, Conn.

No. 262—St. Louis, Mo.—Bids will be received until Apr. 14 for furnishing and delivering 360 tons of bituminous coal to the Federal Building. The specifications require 2-in. lump or over. Address Custodian Fountain Lorthwell, Federal Bldg., St. Louis, Mo.

No. 263—Fall River, Mass.—The American Linen Co. will be in the market about Apr. 1 for 10,000 tons of bituminous coal, delivery by water. Address Pur. Agt. J. E. Osborne, American Linen Co., Fall River, Mass.

No. 264—New York, N. Y.—Sealed bids will be received until 10 a.m., Mar. 6, for furnishing and delivering to the Police Department of the City of New York anthracite coal for use in all boroughs, and also for the steamboat "Patrol" and launches of the Police Department. The security required is 30% of the total bid, and a deposit of 1½% must accompany each bid. Delivery to be completed before July 1, 1915. Address Police Comr. A. Woods, 240 Center St., New York.

No. 265—Meriden, Conn.—The Meriden Gas Light Co. will be in the market about Apr. 1 for 9000 tons of gas coal, delivery via N. Y., N. H. & H. R.R. Address Charles A. Learned, Meriden Gas Light Co., Meriden, Conn.

No. 266—Boston, Mass.—The City of Boston will be in the market about Apr. 1 for a supply of coal for various public buildings and city departments. The present contract was let during May, 1914, and provided for coal as follows: 600 tons for the Children's Institute, 5000 tons for the Infirmary Dept., 10,000 tons for the Ferry Dept., 6000 tons for the sewage-pumping plant at Calf Pasture, 5000 tons to the penal institutions, 9000 tons for the City Hospital and approximately 27,000 tons to other city departments. Address Supt. of Supplies D. F. Doherty, City Hall, Boston, Mass.

No. 267—Pittsfield, Mass.—The S. A. & C. Russell Mfg. Co. will be in the market about Apr. 1 for 2500 tons of bituminous coal, deliveries via B. & A. R.R. and N. Y., N. H. & H. R.R. Address Pres. H. R. Russell, S. A. & C. Russell Mfg. Co., Pittsfield, Mass.

No. 268—Buffalo, N. Y.—Sealed proposals will be received until 2 p.m., Mar. 15, for furnishing anthracite and bituminous coal as required by the Police Department and Patrol Boat for the year beginning Apr. 10. Bids are to be accompanied by a certified check for \$500 and a bond of not less than \$5000 is required. Address Board of Police Comrs., Headquarters Bldg., Franklin and Seneca St., Buffalo, N. Y.

No. 269—Warehouse Point, Conn.—The Hartford & Springfield St. R.R. Co. will be in the market about Apr. 1 for 4000 tons of bituminous coal, delivery via N. Y., N. H. & H. R.R. Address Hartford & Springfield St. R.R. Co., Warehouse Point, Conn.

No. 270—North Adams, Mass.—The North Adams Gas Light Co. will be in the market for 18,000 tons of gas coal about Apr. 1, delivery via B. & M. R.R. Address H. L. Ogden, 131 State St., Boston, Mass.

No. 271—Brattleboro, Vt.—Twin-State Gas & Electric Co. will be in the market for about 500 tons of anthracite coal Apr. 1. Deliveries via B. & M. R.R. and Central Vt. R.R. Address, Twin-State Gas & Electric Co., Brattleboro, Vt.

No. 272—Millis, Mass.—Joseph W. Herman & Co., will be in the market for 400 tons of coal about Apr. 1, delivery via N. Y., N. H. & H. R.R. Address, Joseph W. Herman & Co., 159 Lincoln St., Boston, Mass.

No. 273—Naugatuck, Conn.—The Naugatuck Malleable Iron Co. will be in the market about Apr. 1 for 10,000 to 15,000 tons of bituminous and gas coal, delivery all rail via N. Y., N. H. & H. R.R. Address, Naugatuck Malleable Iron Co., Naugatuck, Conn.

No. 274—Pittsfield, Mass.—Helliwell & Co. will be in the market for 1500 tons of bituminous coal about Apr. 1, delivery via N. Y., N. H. & H. R.R. Address, Helliwell & Co., Pittsfield, Mass.

No. 275—Claremont, N. H.—Claremont Power Co. will be in the market for 1000 tons of bituminous coal about Apr. 1. This coal is usually purchased from local dealers. Address, Claremont Power Co., Claremont, N. H.

No. 276—Bennington, Vt.—The Bennington Gas Light Co. will be in the market for 175 tons of anthracite and 50 tons of bituminous about Apr. 1. This coal is purchased from local dealers. Address, Superintendent, Bennington Gas Light Co., Bennington, Vt.

No. 277—Oxford, Mass.—David N. Taft will be in the market for 500 tons of coal about Apr. 1, delivery via N. Y., N. H. & H. R.R. Address, David N. Taft, Oxford, Mass.

No. 278—Thompsonville, Conn.—The Thompsonville Water Co. will be in the market for 500 tons of bituminous coal about Apr. 1, delivery via N. Y., N. H. & H. R.R. and teams. Address, Superintendent, Thompsonville Water Co., Thompsonville, Conn.

No. 279—Windsor Locks, Conn.—The Northern Connecticut Light & Power Co. will be in the market for 800 tons of bituminous coal about Apr. 1, delivery via N. Y., N. H. & H. R.R. Address, Northern Connecticut Light & Power Co., Windsor Locks, Conn.

No. 280—Mittineague, Mass.—The Southworth Co. will be in the market about Apr. 1 for 3000 tons of bituminous coal, deliveries via N. Y., N. H. & H. R.R. and teams. Address, C. A. Edgerton, Southworth Co., Mittineague, Mass.

No. 281—Laconia, N. H.—Winnebepesaukee Gas & Electric Co. will be in the market for 300 tons of anthracite and 300 tons of bituminous coal about Apr. 1, delivery via B. & M. R.R. Address Winnebepesaukee Gas & Electric Co., Laconia, N. H.

No. 282—Meriden, Conn.—The School Board here will place a contract for about 800 tons of anthracite coal in April. This coal is purchased from local dealers. Address, chairman of Committee on Buildings, School Department, Meriden, Conn.

No. 283—Holyoke, Mass.—The Holyoke St. Ry. Co. will be in the market about Apr. 1 for 9000 tons of bituminous coal, delivery via N. Y., N. H. & H. R.R. Address, Holyoke St. Ry. Co., Holyoke, Mass.

No. 284—Bristol, N. H.—The Dodge-Davis Manufacturing Co. will be in the market about Apr. 1 for 700 tons of bituminous coal. Delivery via B. & M. R.R. Address, Dodge-Davis Manufacturing Co., Bristol, N. H.

CONTRACTS AWARDED

No. 94—New York, N. Y.—The following are the bids and awards on this contract (p. 356) which provides for furnishing and delivering bituminous coal for fire companies in the Boroughs of Bronx and Queens: Olin J. Stephens, Inc., \$570, Bronx (awarded contract); Rudolph Reimer, \$495, Queens (awarded contract); Consolidation Coal Co., \$1078; Jamieson & Bond Co., \$83.30 (informal). Address Fire Comr. Robert Adamson, Municipal Bldg., New York.

No. 98—New York, N. Y.—The following are the bids and awards on this contract (p. 356) which provides for furnishing and delivering anthracite coal: No. 1, for the fire companies in the Borough of Queens, only one bid was submitted, that being from Jamieson & Bond Co., at \$715 (awarded contract). No. 2, for the fireboats, Wm. Farrell & Sons, \$6479; Commercial Coal Co., \$3324 (awarded contract); Meyer-Denker-Sinram Co., \$6112.50; John F. Schmadeke, Inc., \$5995; Bacon Coal Co., \$3384; Burns Bros., \$12,675.50. No. 3, for the companies in Dist. No. 23, Borough of Brooklyn, John F. Schmadeke, Inc., \$2100; A. J. & J. J. McCollum, Inc., \$1995; Bacon Coal Co., \$1947 (awarded contract); Rudolph Reimer, Jr., \$21,000; C. H. Reynold & Son, \$2043. Address Fire Comr. Robert Adamson, Municipal Bldg., New York.

No. 154—Stamford, Conn.—This contract (p. 398), which called for 5000 tons of gas coal, has been awarded. Address G. D. Leland, Supt. Stamford, Gas & Electric Co., Stamford, Conn.

No. 163—Boston, Mass.—The Quincy Cold Storage and Warehouse Co. advises that they have already closed their contract for coal (p. 399.) Particulars are not available. Address Treas. & Mgr. Geo. H. Stoddard, Quincy Cold Storage & Warehouse Co., 133 Commercial St., Boston, Mass.

CONTRACT NOTES

The Board of Administration, Springfield, Ill., recently awarded a contract to Walton & Co. for furnishing anthracite coal to the Chicago State Hospital at Dunning, Ill., at \$6.81 per ton. Address Fiscal Superv. Frank D. Whipp, Board of Administration, Springfield, Ill.

There are growing evidences that operators of Eastern Kentucky intend to more actively solicit business in Indiana, Illinois and Iowa. More arrangements are under way with Indiana and Chicago wholesale jobbers to handle these coals next season, and attempts are being made to substitute these coals for West Virginia splints, with some success. The coals are favorably received by the retailers, and their competition with Indiana and Illinois coals necessarily must increase with the efforts being put forth.

Press reports state that contracts have been signed for 1,000,000 tons of Pocahontas coal for France and England, to be delivered by the Norfolk & Western and the Virginian Ry. at Sewalls Point and Lambert Point, Va. The coal is to be loaded into British ships before June 1.

The Boston Safe Deposit & Trust Co., 100 Franklin St., Boston, Mass., purchase about 1600 tons of coal per year, the usual contract being made with the Staples Coal Co. Deliveries are made as required.

R. M. Sutton & Co., Baltimore, Md., uses an annual supply of 500 tons of standard mine-run coal. At present no contract exists, and bids for furnishing this supply might be considered. Address Pres. John R. Sutton, R. M. Sutton & Co., Baltimore, Md.

C. E. Cotting, Boston, purchases coal for nearly two hundred buildings, and generally closes the contract with the Metropolitan Coal Co. Address Supt. D. F. Kilgour, 11 Pemberton Sq., Boston, Mass.